THE JOURNAL OF LAND & PUBLIC UTILITY ECONOMICS

ECONOMIC ASPECTS OF FORESTRY
W. B. GREELEY

FLUCTUATING STATISTICAL STANDARDS OF PUBLIC UTILITY OPERATIONS
HOMER B. VANDERBLUE AND WILLIAM L. CRUM

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CONTENTS FOR APRIL, 1925

Economic Aspects of Forestry	W. B. GREELEY	129
Fluctuating Statistical Standards of Public Utility Operations	HOMER B. VANDERBLUE AND WILLIAM L. CRUM	138
The Field of Land Utilization	L. C. GRAY	152
Theory and Practice in Land Classification	P. S. LOVEJOY	160
The Meaning of Public Utility — A Sociological Interpretation	MARTIN G. GLAESER	176
Insurance and the Farm Hazards	V. N. VALGREN	189
Public Policy toward Radio Broadcasting	HIRAM L. JOME	198
Taxation of Land in Austria	JOHN V. VAN SICKLE	215
Growth of Urban Population in the United States	ROSALIND TOUGH	226
Department Contents		237
Book Reviews		238
Summaries of Research		247
Comments on Legislation and Court Decisions		250

Subscription Rates: $5 a year; $1.25 a copy. Remittances may be made by personal checks, drafts, post-office or express money orders, payable to A. W. Shaw Company, Chicago.

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Entry as second-class matter applied for at the post-office at Chicago, Illinois, under the Act of Congress of March 3, 1879. Printed in the United States of America.

Editorial Correspondence: Letters regarding editorial matters should be addressed to the Editor, Sterling Hall, Madison, Wisconsin.

Business Communications: Letters concerning subscriptions or advertising should be addressed to A. W. Shaw Company, Chicago. Advertising rates furnished on application.

PUBLISHED QUARTERLY FOR THE INSTITUTE FOR RESEARCH IN LAND ECONOMICS AND PUBLIC UTILITIES. BY A. W. SHAW COMPANY, CASS, HURON AND ERIE STREETS, CHICAGO

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THE JOURNAL OF LAND & PUBLIC UTILITY ECONOMICS

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THE JOURNAL OF
LAND & PUBLIC UTILITY
ECONOMICS

APRIL
1925

VOLUME I
NUMBER 2

ECONOMIC ASPECTS OF FORESTRY

By W. B. GREELEY

THE world's timber supply is drawn from three different sources; namely, (1) the virgin forest, in which the accumulated growth of centuries has been stored; (2) the wild crop of wood which produces itself after logging or fire or the abandonment of tillage, with practically no expenditure of human labor or foresight; and (3) timber culture, representing an expenditure of capital and labor analogous to such expenditures in agriculture. Most of our other basic commodities are produced by mining or by cropping. Timber is distinctive in that, from the practical point of view of a supply of raw material, it may as yet be obtained either from a mine or a crop. The intermediate stage of wild, untended growth may be regarded either as the last dregs of timber mining or the crude beginnings of timber culture.

The economics of forestry rests upon competition between the timber crop and the timber mine. It is written in the immutable laws of commerce that industries seek their cheapest source of raw material. Timber stored up in nature's reservoirs is cheap, while timber produced by man's labor and patience is dear. The great bodies of accessible virgin timber on the earth's surface tend to control the general price levels of forest products, and hence to fix the limits within which timber culture may obtain a competitive foothold. To a less or greater degree, forestry may be induced by legal requirements, public stimulants in the form of tax exemptions and what not, or by sheer frugality in making use of land not adapted to other crops. But as long as virgin stumpage is available at a cost in place plus transportation charges to the consumer which are less than the cost of growing similar or competing woods

EDITORIAL NOTE: The reader should notice that although Colonel Greeley's analysis refers particularly to private forestry, it provides an indispensable foundation for the further consideration of forestry by public agencies. In a later issue, there will be an article dealing especially with public forestry.

near at hand, forestry has no real economic footing.

Economic Basis of Timber Culture

In the long run, the cost of transportation thus becomes a primary factor in the competition between the timber crop and the timber mine. The supply of virgin timber has steadily shrunk, and as steadily has receded from the centers of consumption. When each new reservoir of virgin timber is tapped, the value of its standing trees is almost nothing, like that of the great forests of Siberia today. Not many years ago, large concessions in the coniferous forests of northern Mexico were secured at 6 cents per thousand board feet. All timber values are created largely by transportation differentials between various sources of supply competing for a common market. As the older reservoirs are depleted, the greater haulage costs from the last virgin forests to be exploited are speedily translated into higher values on the remaining timber which is more accessible to the consumer. As the gap widens between the consumer and the nearest source of unmined timber large enough to influence his market, the rising timber values created by mounting freight bills approach the point where trees can be grown near by at a profit. Forestry then becomes economically sound and may be impelled by the very industrial quest for the cheapest source of raw material that formerly led to the timber mine.

All mines are exhaustible and virgin forests are doubly so since to the depletion from cutting is often added an enormous depletion from fire and other destructive agencies. The steady shrinkage and ultimate disappearance of virgin forests tend universally to create values for timber which repay the cost of growing it. Forestry is the final source of satisfying needs for wood upon which, sooner or later, the whole world will be thrown. It represents the last stage in an evolutionary process in which the supply of timber is shifted from a temporary and exhaustible source to a permanent and sustaining one—from the timber mine to the timber crop.

Aside from the competitive opening created usually by transportation costs from virgin sources, many other factors necessarily influence the rate and extent to which the timber crop takes the place of timber mining. The rising cost of forest products is normally reflected in their reduced consumption and in the substitution of other materials for wood. Both curtail the market available to the timber grower. The cost of producing wood may be materially lessened by favorable forms of land taxation, and, on the other hand, may be kept above the limits of practicable competition by either excessive taxes or methods of taxation ill adapted to a 50- or 75-year crop. The cost of timber farming may be reduced if security is provided by public agencies from fire losses, or may be so uncertain and speculative by reason of this hazard that it has no sound economic footing. Little or no land may be available that is adapted to timber culture, as in the prairie regions of the United States, or that cannot be employed more profitably in other crops. On the other hand, the inertia of old land practices and conceptions and ignorance of cultural methods may hold forestry back long after it has become an economic form of land use. And as a further contingency, the pressure to employ idle land may lead to timber cropping under conditions where its returns are ques-

tionable from the economic point of view.

To these complexities must be added the enormous disparities in the quantity and quality of wood that can be grown in the same space of time on different soils and under different climates. Evidently no precise analysis of the economics of forestry can be attempted. The picture is broadly sketched, however, by a few basic facts. Wood is one of the essential raw materials of civilized peoples. The world consumes 56 billion cubic feet of wood annually, and it will always be demanded in enormous aggregate quantities. The source of wood is progressively shifting from the virgin forest to the timber crop. The law of supply and demand has created values for forest products which make timber cropping profitable on a substantial part of the soil of many countries. The further diminution of virgin stumpage is extending the land areas susceptible of remunerative employment in forestry, particularly as the total timber supply of the world is being consumed more rapidly than it is being replaced.

The tendency in all countries and regions as wood becomes higher in price and more difficult to obtain is to develop taxation and other public policies designed to cheapen and encourage its production. And a corollary, equally universal, is the tendency of the state or community to take a direct hand in the growing of timber.

Economic Basis of European Forestry

Before attempting to analyze the situation of the United States, in the light of these more or less theoretical conceptions, a glance at what has transpired in Europe may be illuminating. Nearly every country of western Europe went through a period of depleting its virgin forests, or such of them as were available under the social structure of the times. Their early forestry was not economic, but had to do with game on the estates of the nobility. Timber mining was a more gradual and less destructive process in the Old World than it has been in the United States and Canada. But it reflected precisely the same commercial quest for the cheapest source of raw material. The threat of a timber famine is nothing new. Germany faced it at the close of the Thirty Years' War. And it prompted the forest code of France which Colbert drafted in 1669.

As their stocks of old growth stumpage approached exhaustion, most of the European countries cast about for such wood as they could command in barter with their neighbors. And as the law of supply and demand forced the value of forest products upward, timber growing claimed the portions of their soil where this crop could compete with agriculture. By and large, the timber business of Europe now finds its cheapest source of raw material in local forest culture. But the timber production of the western and central countries is inadequate for their requirements and must be supplemented by imports from northern and eastern Europe and from North America.

European forestry is commonly regarded on this side of the Atlantic as an outgrowth of law and public control over private property. This is largely untrue. In restricted fields, like the French régime for alpine areas, and in a few countries, like Switzerland and Sweden, control is exercised by the state over private timberlands. Commercial lumbering is not restricted in France save on areas to which special public interests attach, like national defense or

the prevention of erosion. Nor is it seriously restricted in most of Germany. Even the special exemptions and forms of encouragement in forest taxation have not been relatively important. A more impelling influence has been the conservative temper and frugality of peoples trained by centuries of close living to make the most of limited resources. The ownership of forest estates has also contributed to social prestige. Conservative forest management has often indeed been required by various forms of entail. Many areas have thus been kept in forest generation after generation which earn interest of not more than 2½% or 3%.

But the basis of timber culture in Europe is economic. Its lessons will not be read aright by Americans in any other light. Forestry the world over has little place in the calculations of business until it produces the materials required by industry and commerce as cheaply as they can be procured from any other source. Forestry is rooted in the land practice of the older countries primarily because it meets this competitive test.

Influence of Cheap Virgin Timber in the United States

The source and use of wood in North America have been controlled by vast supplies of cheap virgin timber. The continental United States originally contained 820-odd million acres of virgin forest. So cheap, indeed worthless, was this resource during the first 2½ centuries of American settlement that the timber on 150 million acres of land cleared for cultivation was burned or thrown into rivers for lack of a market.

The quest for the cheapest supply of raw material has directed the geographic course and molded the character of the timber business in America. Our first sawmills and wood-working shops were built in the shade of old-growth pine and oak had for the taking. The subsequent course of forest industries has largely been a matter of tapping one reservoir of virgin timber after another in the order of their accessibility. Cheap stumpage has led them—north, south, and west—with always a frontier of forest wilderness to fall back upon when the immediate supply should be exhausted.

Vast holdings of timber were acquired from successive portions of the public domain for next to nothing. The first large operators in the Lake states supplied their sawmills with virgin white pine of incomparable quality which cost a few cents per thousand board feet. In the 80's and 90's, manufacturing units were blocked up in the southern pineries at $1 or $1.25 per acre. As late as 1900, about 900,000 acres of timberland in the Pacific Northwest were purchased from railroad grants at an average cost of 15 cents per thousand board feet. As long as virgin timber was available in such quantities and at such negligible costs, it is obvious enough that timber culture had no competitive foothold. Our original stock of stumpage probably exceeded 5 trillion board feet. The largest cut taken from our forest in any one year has probably not been more than 65 or 70 billion board feet. The enormous supply of virgin stumpage in the United States had to be depleted by a long period of timber mining before there could be an economic opening for the timber crop.

Timber Depletion and Increasing Costs

As in the case of the older countries, the degree of timber depletion necessary to admit competition from forest

culture in the United States is indicated more clearly by the cost of transportation than any other factor. Our lumber industry has followed the retreating frontier of virgin forests. Its source of supply has shifted steadily to points more and more remote from the average consumer of the manufactured product. Transportation cost has been the key to lumber prices. Each fresh shift in the source of supply has lengthened the lumber haul and forced retail prices to a higher level.

When the principal markets were supplied from the forests of Maine, New York, and Pennsylvania, lumber was cheap because it was shipped but short distances and largely by water. In the 80's and 90's, the center of lumber manufacture shifted to the Lake states and the box car began to gain ascendency as a lumber carrier. Even on shipments through the Erie Canal, the cost of delivering lumber into New York City rose to $6 or $7 per thousand board feet, or three times the former transportation cost on Hudson River pine. As the more accessible forests in the region of the Great Lakes were exhausted, freight charges advanced and retail lumber prices rose from one level to another.

After 1890, the center of softwood lumber manufacture again shifted, to the pineries of the South. Rail shipments of 750 miles or more and freight charges of $8 or $10 per thousand board feet became common. As late as 1902, short hauls from the Lake region kept cargo prices on pine board in Chicago down to $16 per thousand board feet or less. When southern pine wrested control of this market from the northern mills, lumber prices advanced from 75% to 100%. Southern lumber was shipped 1,100 miles to Pittsburgh and 1,500 miles to Boston, at freight rates which now range from $12.50 to $15 per thousand feet, and retail prices steadily climbed.

The cut of softwood lumber in the South passed its peak about 1916. It will continue to be an important factor in the national supply for years to come, but the control of the great softwood markets of the country is gradually passing to the Far West. In 1922, 40% of our entire lumber production was manufactured in the South and over 33% on the Pacific Coast. Washington and Oregon have become the leading lumber-producing states. Western lumber is now moving in increasing quantities 2,000 or 2,300 miles by rail to the Mississippi Valley at a freight cost of $17 or $18 per thousand feet; and 7,000 miles through the Panama Canal to northern Atlantic ports at a charter rate of $14 or $16. It is even reshipped inland from the east coast as far as Pittsburgh and Cincinnati. The normal movement of retail lumber prices must necessarily be upward to meet this new level of transportation cost.

The marvelous transportation system of the United States has somewhat concealed the progressive depletion of our old-growth stumpage. This is the first country in the world where the exhaustion of timber in one section could be met readily by the cutting of forests 2,000 miles distant. Because of our transportation system, all of our virgin timber has practically been pooled and an enormous use of forest products has been maintained with no appreciable jar to current consumption other than higher freight bills. Nevertheless the hard facts of geography have begun to tell. About one-third of the virgin timber supply is left, and, as would be expected, the drive of economic forces seeking the most accessible source of raw material has left the bulk of it in

the portion of the country farthest removed from the center of consumption. Seventy-five per cent of the remaining virgin timber is in the far western states, but two-thirds of the lumber cut is consumed in the central and eastern states.

In 1920 the average carload of lumber was hauled 485 miles. This distance was greater by nearly one-third than the average haul in 1914. In 1920 our lumber traffic exceeded 1,660,000 carloads and rolled up a freight bill of $250,000,000. A large proportion of American consumers now pay a transportation cost on lumber which is more than its delivered price 30 years ago.

While higher transportation charges underlie the advances in lumber prices, they are not of course the only factor. As in all business, costs and profits in the retail distribution of lumber tend to pyramid upon every increase in freight or other outlays incurred by the distributer. Furthermore, as the cut of lumber dwindles in one or more of the producing regions which have shipped into a common market, and as manufacturing plants become more largely concentrated, the competitive movement of lumber into consuming territory is somewhat curtailed. Retail prices are usually quick to reflect such changes. In 1905, for example, a group of Minnesota towns obtained 91% of their lumber from the Lake states. Sixteen years later, in 1921, 92% of their supply came from the Pacific Coast. In this interval, the average freight cost advanced from $3.25 to $18.12 per thousand board feet; but the average selling price rose from $26 to $53.58. The actual cost to the consumer had more than doubled. During the last 80 years, in fact, lumber prices in the United States have advanced 3½ times as fast as the index price of all staple commodities. In general terms at least this is a fair measure of the net effect of the depletion of our virgin timber.[1]

Timber Values and Forest Culture

Our immediate inquiry in relation to the economics of forestry is the effect of timber depletion upon the value of standing trees and the point at which the rising price of stumpage resulting from the reduced supply makes timber culture profitable. The movement of timber values in the United States, while influenced by many factors speculative and otherwise, clearly reflects, region by region, the cost of transportation from the virgin frontier. The successive increases in the freight charges borne by our central and eastern lumber markets, once fairly established, have largely been absorbed in the value of the locally remaining or locally grown timber which enters the same market. The virgin white pine still left in Minnesota, acquired shortly after the Civil War at a few cents per thousand board feet, is now worth $20 or more per thousand. The rising value of old-growth longleaf pine in the southern states reflects the same principle in a region where the process of depletion has not yet run its course. When extensive purchases of southern pine began, about 1880, the value of the timber in large tracts seldom exceeded 10 cents per thousand feet. In 1915, at about the peak of the lumber cut from this region, its stumpage averaged approximately $4.50 per thousand feet. In 1920, with a declining cut and more favorable freight differentials against competing western timber, the average value had risen to $9.50; and recent sales have been reported at $12 per thousand feet.

[1] These figures and a number of others are quoted from "Timber: Mine or Crop?" United States Department of Agriculture *Yearbook* for 1922.

The rise in value of wild crops of timber, in old forest regions where second-growth has become a factor in the lumber trade, has been particularly striking. Extensive cutting of second-growth white pine in New England, self-sown on old loggings or abandoned farm lands, began around 1900. This stumpage, 30 or 40 years old and suitable mainly for box-making, was then worth about $4 per thousand board feet. By 1920 it had advanced to an average of $10 in Maine and $16 in Massachusetts and New Hampshire. A similar rise has taken place in the value of second-growth yellow or "old field" pine in the northern coastal belt extending from Maryland into North Carolina. Thirty- or forty-year-old timber in this section, furnishing low-grade construction lumber, now brings from $6 to $10 per thousand board feet. Its value has probably trebled during the last 20 years. Young hardwoods of highly prized species, like ash and hickory, grown in the woodlots of Ohio and Indiana, now commonly bring at least $16 or $18 per thousand board feet.

The cost of transportation from the retreating sources of virgin timber has largely created these stumpage values for locally produced second-growth. The rapid rise in price of young coniferous woods in the eastern states has occurred since 1900. It has been coincident with the sharp drop in lumber production in the region of the Great Lakes and the migration of the sawmills to the South and West. It is reasonable to believe that this trend will be maintained as the production of southern lumber dwindles and our principal source of softwoods shifts to the Pacific Coast. Underlying the movement of stumpage values in the United States, furthermore, is the basic fact that our timber supply is being reduced by cutting and natural agencies probably four times as fast as it is yet being replaced by new growth. The law of supply and demand can hardly fail to force the values of stumpage upward until an approximate balance is reached.

Cost and Income in Forest Culture

At what point in this process does the growing of timber become commercially feasible? Half a dozen elements affect the answer to this question. The volume of wood crops obtainable under forest culture varies widely in different regions, as determined by their soil and climate. There is equal variation in the time required to produce marketable products and in their commercial quality. The initial cost of the crop may be very low, as in the case of natural seeding, or comparatively high, where planting by hand is required. The outlay for protection from fire, the degree of security obtained, and the burden of accumulated taxes on land and growing timber are factors of primary importance. For many of these elements we must await the results of further research or experience before the value of timber which admits successful competition from forest culture can be determined with any finality. In the young softwood forests of the eastern states, established mainly by natural seeding and merchantable at an age of 30 or 40 years, it seems probable from the facts at hand that a stumpage value of $8 or $10 per thousand board feet offers sufficient profit to invite commercial investment.

Two facts have a pertinent bearing upon the economic competition of the timber crop. The first is that the present values of many hard- and softwoods in portions of the eastern United States, and especially the value of second-

growth, have already reached or exceeded the prices obtained in France, Germany, or Sweden before the war for the corresponding products of their forest culture. The second is that timber growing has already made substantial headway in our older forest regions. This is true not only on many farm woodlots and other small holdings in the eastern states where owners have acted on instinctive thrift rather than close calculations of expected returns. It is also true in a growing degree of large landowners and lumber and paper companies whose foresight has recognized the necessity for turning to a new source of raw material and the opportunity for profit offered by reforestation, even though it cannot yet be reduced to precise figures. Commercial incentive is beginning to cut the Gordian Knot. The industrial quest for the cheapest source of raw material that formerly led to the timber mine is already turning to the timber crop.

Expanding Areas of Economic Forestry

The essential point in the economics of our timber supply is that whatever stumpage value be assumed as establishing a competitive opening for forestry, with reasonably favorable conditions of growth and hazard, the portions of the United States in which that value obtains are steadily widening. The process might almost be forecasted by plotting a series of transportation zones, decade by decade, around the virgin woodlands still extensive enough to influence the principal consuming markets. About three-fourths of our forest land lies west of the Great Plains. As the virgin timber becomes more and more concentrated in the Far West, the nearest of this vast area susceptible of timber culture will enjoy a freight differential of at least $10 or $12 per thousand feet favorable to its locally grown stumpage. In fact, commercial reforestation has already begun on the Pacific Coast itself.

Just what freight differentials, or local stumpage values, are necessary to bring timber culture into play are not material. The depletion of our virgin forests goes steadily on. The transportation charges on their products are steadily rising. Not only are the shipments from manufacturing plants traversing greater and greater distances; logging operations are pushing back into the less accessible areas of the West and incurring higher costs on their output before it reaches the sawmill. Just as inevitable as the progressive exhaustion of our remaining virgin forests is the unescapable fact that on a constantly expanding area forestry will afford the cheapest supply of raw material which the timber business of the United States, through its entire history, has so unerringly sought. Ultimately our timber supply must pass over entirely to the forest crop.

Forest Economics in Europe and America

As a general background for forest economics in the United States, our situation may be compared with that of Europe in a few salient points.[2] Excluding Russia, which still contains large areas of virgin forest and does not utilize fully the production of her timbered lands, 25.3% of the land area of Europe is in forest. The productive forests of the continental United States, excluding completely denuded lands and areas of scrub woodland, cover 20.4% of the

[2] The European figures are mainly quoted from Zon and Sparhawk, *Forest Resources of the World*, McGraw-Hill, New York, 1923.

land surface. Europe has 94 acres of forest per 100 inhabitants, the greater part of which produces a continuous yield under some method of timber culture. The United States has 353 acres of forest per 100 inhabitants, but 35% of it carries virgin timber in storage and produces little or no growth. Much of the rest is but half-stocked. The average yearly production of wood from Europe's forest area, about 30 cubic feet per acre, is in fact at least double that of the United States.

The present stand of merchantable timber in Europe is probably around 1,140 cubic feet per capita as compared with about 6,800 cubic feet in the United States. On the other hand, the yearly consumption of wood in Europe is 32.7 cubic feet per capita as contrasted with 212 cubic feet in the United States. While the cut of timber in Europe is very nearly balanced by current growth, the consumption of wood in the United States is four times the annual growth of her forests.

These facts underlie the stability of timber supply and use in the Old World as compared with the very unstable conditions in the United States. In the one case, ignoring compensating exports and imports, a moderate use of timber is almost entirely supplied by its current growth. In the other, an enormous use is almost entirely supplied by current growth, is still possible only by reason of the large forest area and the remaining stock of virgin stumpage per capita.

Proportionality in Forest Land Economics

Economic forces are pressing steadily toward a stabilization of timber supply and timber use in the United States. Higher prices are curtailing the consumption of wood. The per capita use of lumber has dropped 40% from the peak of 516 board feet in 1906; and the substitution of other materials like steel, cement, and clay products is gradually extending. The greater value of timber is reducing the waste in its manufacture and use and thereby lessening the drain upon the forests. And the rising value of stumpage is behind a powerful commercial impetus for timber culture.

Another factor of importance is that after three centuries of settlement and expanding agriculture, one-fourth of the soil of the United States remains today forest land or idle land adapted to timber growth. There is small likelihood of serious competition with forestry in the future use of this much of the nation's soil. In fact, the pressure for its employment will add weight to the industrial quest for a new source of timber. Furthermore, the policies of our state and national governments are clearly recognizing the necessity, from the standpoint of both timber supply and land employment, for encouraging commercial reforestation. The aim of the recent Clarke-McNary forestry law is to clear the path for the economic forces behind timber growing by giving forest crops security from loss by fire and from inequitable burdens of taxation.

Forestry in the United States has ceased to be a "new theory," a crusade, or a function restricted to public agencies and public lands. It has become an affair of every-day business. It is at bottom a matter of economics in the use of land and the production of raw materials. In this relationship to American industry, its rapid spread in the United States is inevitable.

FLUCTUATING STATISTICAL STANDARDS OF PUBLIC UTILITY OPERATIONS

By HOMER B. VANDERBLUE AND WILLIAM L. CRUM

THE adjustment of operating and investment policies to fluctuating operating conditions is one of the most difficult problems faced by all business men. To public utility enterprises a proper adjustment of this kind is especially significant, since the utilities are obligated to furnish continuous and adequate service at all times, including the period of peak load. The forecasting of the changing requirements of operating activity in the immediate future becomes then a central task in the formulation of operating policies, and the reliability and accuracy of these forecasts is a matter of concern, not only to the company's officials but also to the customers dependent upon the service. Primarily this is a problem for statistical analysis and the question is immediately raised: "What is the best method of obtaining the data necessary to make these judgments?" An answer to this question involves analysis of past and current operating statistics with a view to projection into the future.

The object of this article is to describe and explain some of the chief statistical devices by which numerical standards can be established and used as bases for the comparison and interpretation of current operating statistics. Although the presentation herein rests throughout upon an illustration drawn from the public utility field, the methods are applicable also in manufacturing, transportation, and merchandising.

The data used in the present study are monthly figures of gross revenue derived from electric sales (in dollar-value units) and energy sold for lighting and for power (both in physical units) by the Public Service Electric and Gas Company.[1] The Company, a subsidiary of the Public Service Corporation of New Jersey, furnishes electricity to five-sixths of the population of New Jersey. While the particular statistical series here considered shed light upon problems of very broad general importance in the management of the company, similar analyses could be made of various items of expense, of comparable data for different generating stations, or for different cities or industrial areas. Such studies would doubtless assist in the solution of detailed special or even routine problems.

I. Standards Derivable from the Data

The determination of current operating standards implies ordinarily the measurement of the secular trend and seasonal variation. The *secular trend* is the growth factor (the "growth" may be negative, in the exceptional case of a declining business). It is the long-time tendency, persistently upward, sidewise, or downward, which survives the minor fluctuations within any one year and the cyclical oscillations extending over several years.

[1] Successor to the Public Service Electric Company. Data for this study were obtained through the generous cooperation of H. H. Holding of the Company, and of Bonbright and Company and their representative, W. K. Shepard. See analysis from another point of view in the *Harvard Business Review*, July and October, 1924.

Chart I shows the movements of the series for gross revenue (see Table I for data), and it is evident that the trend is strongly upward. Careful examination of the chart reveals two breaks in the trend, one in 1914 and the other in 1919. A separate trend, therefore, was calculated for each of the three sections 1904–14, 1914–19, and 1919–24.

It is important to observe that the fitting of a straight-line trend to a curve plotted on a logarithmic scale means that the long-time movement is at a constant *rate* of increase. If this curve were plotted on an arithmetical scale, it would be found that a straight line would not fit any of the intervals, for instance 1904–14. A satisfactory fit could be obtained only by the use of a "compound-interest" curve. On the other hand, had the actual data been plotted on an arithmetical scale originally, and had it been found that a straight line did fit the resulting curve (or a portion of it, for example 1904–14), a long-time movement in the nature of an annual increase by an *additive constant* would have been indicated. A large number of the familiar series of economic and business statistics have trends of this latter sort; and it is essential to note that the series under review belongs in the former group, with trend increasing at a constant rate.

Straight lines were fitted to the logarithms of the annual averages of the data of Table I, for each of the three intervals, by the method of least squares.[2] The results are shown in

[2] For detailed explanation of method, see *Review of Economic Statistics*, Vol. I, p. 12; and, for a non-technical manual of instructions, see *Comparison of an Individual Business with the Harvard Index of General Business Conditions*, published by the Harvard Economic Service, 1924, and reprinted in *Problems in Business Economics*, by H. B. Vanderblue (A. W. Shaw Co., 1924).

TABLE I. GROSS REVENUE FROM ELECTRIC SALES, ACTUAL DATA

(*Unit: $1,000*)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1904	288	261	249	239	225	228	223	234	250	281	312	332
1905	341	298	284	277	267	267	264	276	295	329	376	399
1906	405	355	321	313	290	298	284	300	319	369	411	449
1907	458	384	353	359	345	335	321	337	373	418	454	484
1908	447	403	365	353	329	330	318	327	354	400	457	490
1909	489	443	404	397	362	376	347	365	402	447	515	545
1910	547	495	460	450	423	431	399	422	460	514	599	624
1911	643	579	528	510	484	491	452	479	526	595	667	701
1912	729	630	608	588	558	522	508	533	588	678	734	788
1913	807	697	672	652	609	598	580	593	663	761	812	882
1914	895	801	696	738	685	663	654	658	710	807	851	933
1915	926	838	792	776	737	755	726	742	827	918	1,016	1,116
1916	1,101	1,036	1,031	962	925	945	883	940	992	1,108	1,224	1,363
1917	1,367	1,193	1,261	1,126	1,143	1,133	1,070	1,089	1,146	1,363	1,414	1,526
1918	1,330	1,221	1,390	1,380	1,337	1,328	1,335	1,374	1,429	1,553	1,614	1,876
1919	1,819	1,631	1,637	1,515	1,458	1,417	1,398	1,454	1,523	1,774	1,856	2,146
1920	2,186	1,903	1,989	1,834	1,684	1,713	1,683	1,769	1,766	1,973	2,134	2,395
1921	2,299	2,072	1,989	1,986	1,779	1,728	1,629	1,661	1,764	2,081	2,331	2,621
1922	2,592	2,271	2,245	2,103	1,948	1,925	1,831	1,967	2,197	2,523	2,720	2,767
1923	2,958	2,625	2,598	2,476	2,281	2,186	2,034	2,147	2,216	2,726	2,923	3,222

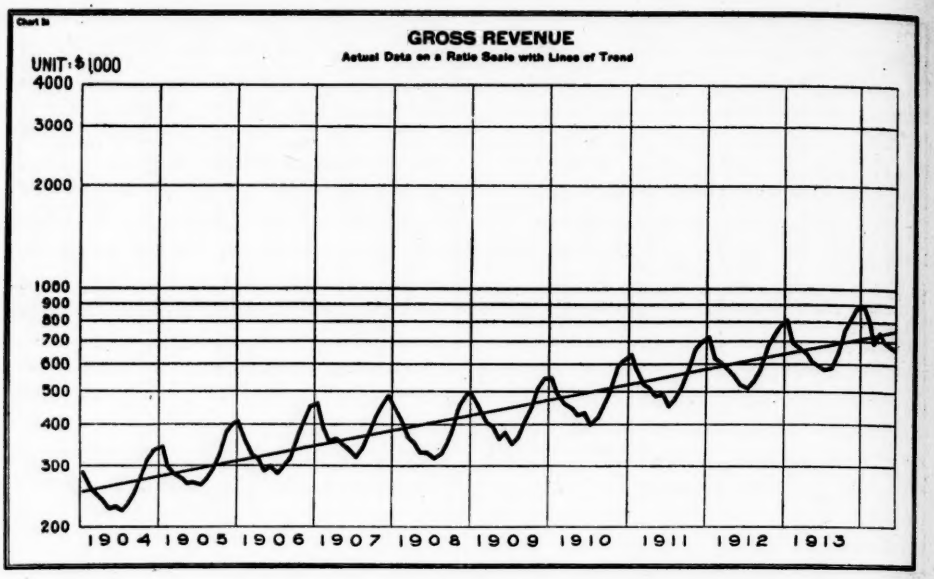


Table IIA. The immediate result of the application of the least-squares method for any one interval (say 1904–14) is a straight line fitted to the logarithms of the data of Table I; that is, a straight line fitted to the curve plotted on a logarithmic scale, as shown in Chart I. For further use in the analysis we need to know not the positions of points on this *line* but the positions of points on the corresponding compound-interest *curve* which would fit the data of Table I had they been plotted on an ordinary arithmetical scale. Thus, the number 255 of Table IIA pertains to the point on the compound-interest curve for January, 1904, and is assumed to be the "normal" revenue for that month.[3]

A striking relation shown by Table IIA is that the average annual rate of increase since the war is nearly identical with that before the war. This is perhaps to be expected, and it gives greater confidence that the "trend" found for the final interval is in fact trend, and not a composite of trend and cyclical tendencies.

In this connection it is well to observe that one would ordinarily not think of fitting trends to such short intervals as those here used: 1914–19, 1919–24. This remark applies the more forcibly to the two short intervals being considered, one covering the war years and the other the early reconstruction years. In the war-time interval there were sweeping alterations in

[3] This 255 is the *ordinate* (distance above the horizontal axis from which vertical measurements would be made had the curve been plotted on an arithmetical scale) of the January, 1904, point on the compound-interest curve which gives the trend 1904–14. The determination of this ordinate of the curve, 255, depends upon the previous determination of the ordinate of the line which fits the logarithms (or fits the curve plotted on a logarithmic scale). The ordinate of the line for January, 1904, is 2.4071, and is found by direct application of the methods referred to in Footnote 2. Account is then taken of the fact that this ordinate of the line, 2.4071, is the logarithm of the corresponding ordinate of the compound-interest curve. Use of a logarithm table shows that the desired ordinate of the curve is 255, since 255 is the "antilog." of 2.4071. In like manner the ordinates of the curve are obtained for all months, by first getting the ordinates of the line.

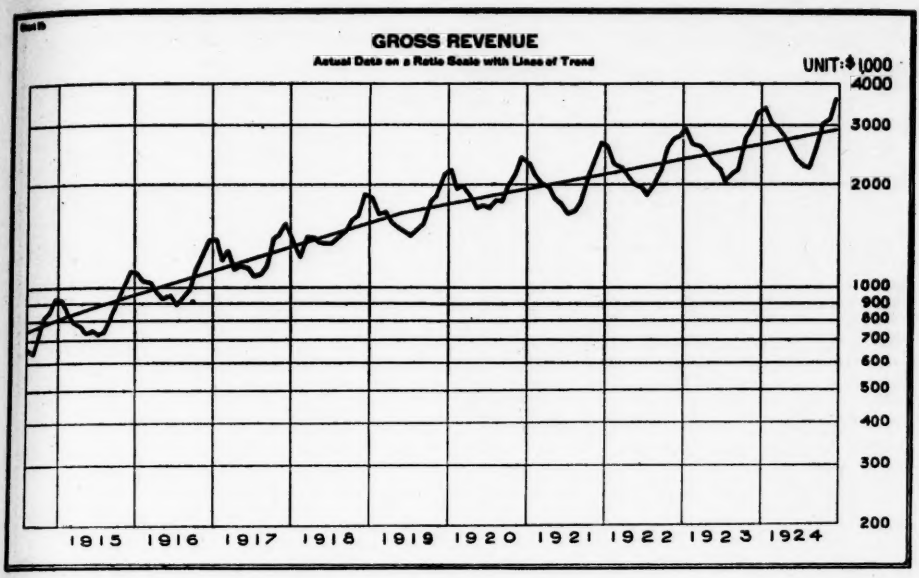


TABLE II. GROSS REVENUE FROM ELECTRIC SALES, NORMAL TREND

(Unit, for the ordinates: $1,000)

A. DESCRIPTION OF THE TREND FOR EACH OF THE THREE SECTIONS OF THE INTERVAL FROM 1904 TO 1924, INCLUSIVE

Section	Years to Which Trend Was Fitted	Average Annual Percentage Increase	Computed Normal Revenues* at Beginning and End of Each Section with Dates of Said Normals
I	1904-1914	10.9%	255; January 15, 1904 763; August 15, 1914
II	1914-1919	17.3%	774; September 15, 1914 1,527; December 15, 1918
III	1919-1924	11.1%	1,578; January 15, 1919 2,962; December 15, 1924

*Unit: $1,000.

B. ORDINATES OF TREND FOR THE POST-WAR SECTION, 1919–24

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	1,578	1,592	1,606	1,620	1,634	1,649	1,663	1,678	1,693	1,708	1,724	1,739
1920	1,755	1,770	1,786	1,802	1,818	1,834	1,850	1,867	1,884	1,900	1,918	1,934
1921	1,952	1,969	1,986	2,005	2,022	2,041	2,058	2,077	2,095	2,114	2,133	2,152
1922	2,171	2,190	2,210	2,230	2,250	2,270	2,290	2,310	2,330	2,351	2,373	2,394
1923	2,415	2,437	2,458	2,480	2,503	2,525	2,548	2,570	2,593	2,616	2,639	2,663
1924	2,685	2,710	2,734	2,759	2,784	2,809	2,833	2,859	2,884	2,910	2,936	2,962

TABLE III. INDEXES OF SEASONAL VARIATION

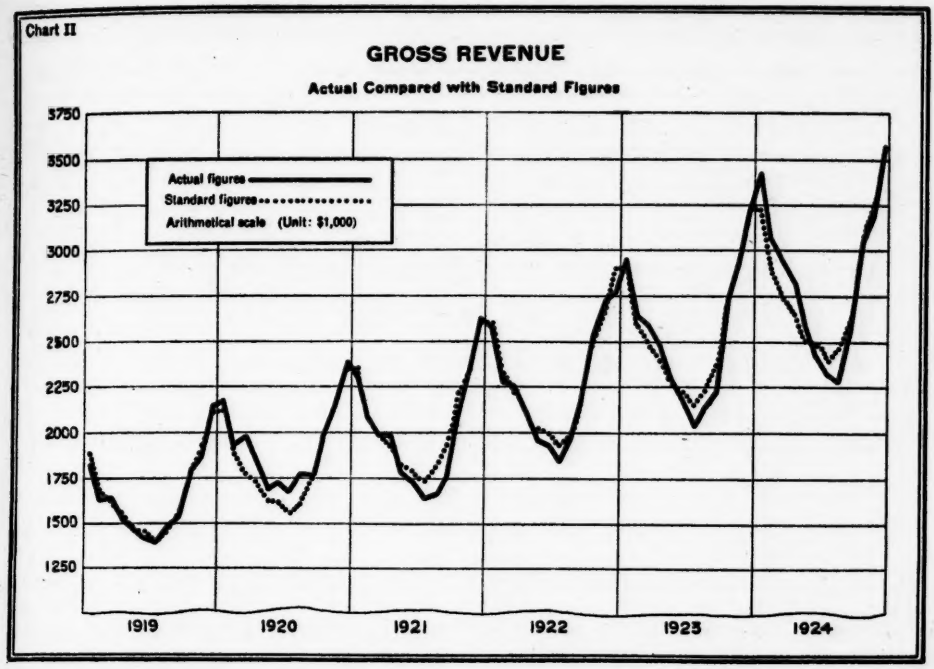
Month	Public Service Company			United States
	Gross Revenue	Kw.-Hr. Sold Lighting	Total Kw.-Hr. Sold	Output of Electricity
January	120	139	112	106
February	106	113	103	95
March	100	109	101	103
April	96	96	97	96
May	90	83	94	98
June	88	76	94	97
July	84	72	88	97
August	86	73	92	100
September	92	82	94	97
October	105	104	104	103
November	112	117	107	103
December	121	136	114	105

the organization and direction of our industrial effort and there were extensive price changes which had, besides their direct influence on the affairs of individual enterprises, an indirect effect upon every series of figures given (as are the revenues of a company) in dollars. In the reconstruction years many of the war-time dislocations were being removed, but some of the changes which had taken place were becoming established on a fairly permanent basis. These features of the industrial history 1914–24 are, in general, sufficient objections against fitting trends over those years, unless strong supporting evidence can be found in the individual instance. The justification for departing from the rule is found in the great regularity of the movement shown by Chart I. The sales of the Company present the unusual condition which warrants fitting the trends. Examination of the curve shows that whatever cyclical fluctuation may exist is subordinate to the strong secular trend and seasonal wave. It is only on this ground that it is safe to fit the trends by the method of least squares to the brief war-time and post-war intervals.

TABLE IV. GROSS REVENUE FROM ELECTRIC SALES, STANDARD FIGURES, BY MONTHS, 1919–24

(*Unit: $1,000*)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	1,894	1,688	1,606	1,555	1,471	1,451	1,397	1,443	1,558	1,793	1,931	2,104
1920	2,106	1,876	1,786	1,730	1,636	1,614	1,554	1,606	1,733	1,995	2,148	2,340
1921	2,342	2,087	1,986	1,925	1,820	1,796	1,729	1,786	1,927	2,220	2,389	2,604
1922	2,605	2,321	2,210	2,141	2,025	1,998	1,924	1,987	2,144	2,469	2,658	2,897
1923	2,898	2,583	2,458	2,381	2,253	2,222	2,140	2,210	2,386	2,747	2,956	3,222
1924	3,222	2,872	2,734	2,649	2,506	2,472	2,380	2,459	2,653	3,056	3,288	3,584

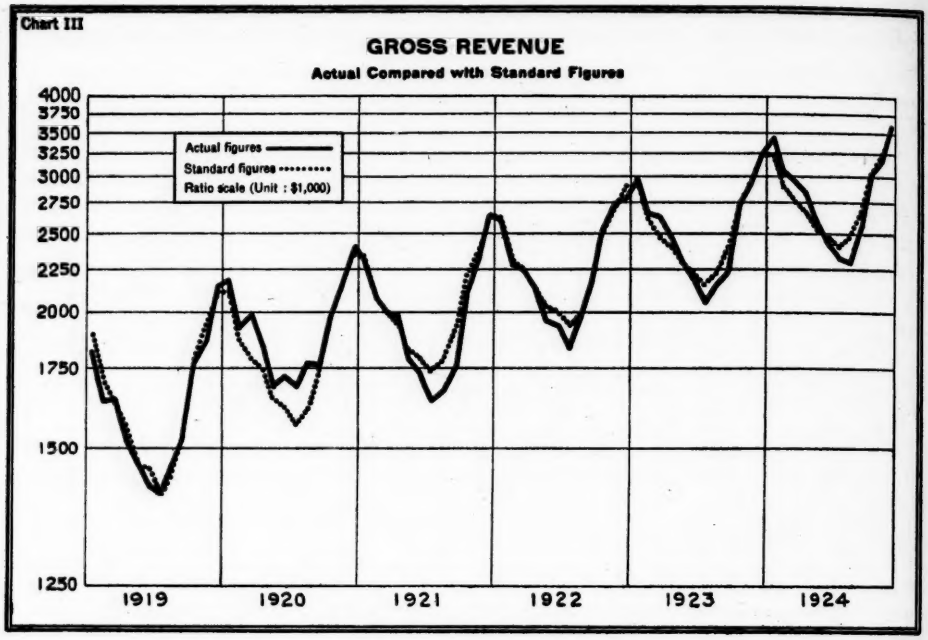


By use of the trends shown in Table IIA, ordinates (in terms of the original units, thousands of dollars, and not of their logarithms) are found for all months of the 21 years; and a section of the results appears in Table IIB. Each item of Table I is then divided by the corresponding ordinate; and the results exhibit all the fluctuations in the original data, except the secular trend.

The *seasonal variation* is a wave-like swing having substantially constant form and intensity in each of many successive years. Examination of Chart I suggests that there is a highly regular seasonal swing in the series. It shows, moreover, that the cyclical movement is minor, since the oscillation within each year accounts for most of the departure from the line of trend. No exceptionally large or small deviations, which would be marked by prominent extreme peaks or dips, appear in the chart. For such a series, the seasonal indexes can be obtained by using the ratio-actual-item-to-ordinate device.[4] The resulting indexes are shown in Column 1, Table III. As tests, made to ascertain whether the form or intensity of the seasonal swing varies in different parts of the entire interval, show no satisfactory evidence of such variation, the single group of indexes applies to the entire interval.

At this point it is possible to construct a monthly series of "standard" sales. The two elements—ordinate of secular trend and index of seasonal variation—for the standard appear in Tables IIB and III, respectively. Each ordinate of trend is multiplied by the appropriate index of Column 1 in Table III (expressed in decimal, rather than percentage, form), and the results, 1919–24,

[4] Described in an article by Professor H. D. Falkner, *Journal of the American Statistical Association*, June, 1924.



appear in Table IV. These items of Table IV are the *standard figures*, and they indicate the values which the revenues would have if the sole causes of fluctuation were the normal secular trend and seasonal variation.

Charts II and III compare the actual figures of Table I with the standard figures of Table IV, for the years since the close of the war. In Chart II the vertical scale is arithmetical, and the difference in elevation of the two curves in any particular month represents therefore an *absolute* difference: it represents the amount in dollars of deviation from the standard. Chart III, on the other hand, with its logarithmic vertical scale, stresses the *relative* deviation from the standard; it facilitates study and comparison of the percentage relations of actual to expected revenues.

It is obvious that the standard figures can be *projected*, in Table IV or Charts II and III, into the future. The number of months or years over which this projection is extended will depend upon the degree of confidence in the fixity of the trend and seasonal variation as at present measured. With no clear reason at hand for expecting an early considerable modification in either element, both can be assumed fixed, and the projection extended for two or three years. Later, as subsequent actual figures come to hand, the existing measurements of trend and seasonal movement can be checked. At intervals of one or two years new trends and new seasonal indexes can be calculated. In so far as these differ from those currently in use, changes should be made, and corresponding modifications should be applied to current and projected standards.

Standard figures, computed for current months and projected into the future according to methods outlined above, and occasionally checked and im-

proved in the light of additional data, furnish a basis for the appraisal of current operating activity. The comparison of actual performance with the expected standard can be made by means of graphic devices, such as Charts II and III, or arithmetical computations. The most obvious arithmetical comparisons consist in deducting the standard from the actual and dividing the actual by the standard, in each month. The first of these numerical comparisons can well be supplemented by calculating the total "difference from standard," and the second by deriving the average "percentage of standard," for the last 12 months. These computed comparisons are indicated, for a brief part of the period studied, in Table V.

Whatever be the method used in effecting a comparison of actual current data with the computed standards, the deviations found can be assumed as due to (1) cycles of business prosperity and depression, (2) irregular or exceptional occurrences, (3) imperfections in the measurements of trend and seasonal variation. Causes of the second sort —wars, strikes, epidemics, unusually severe storms, conflagrations, momentous inventions—by their very irregularity cannot be covered by any computed standard; and the coming of such an event precipitates an emergency, preparation for which does not consist in statistical analysis. Causes of the third sort, if the problem is one for which the calculation of standards is appropriate and if the analytical work is done with care, are ordinarily negligible.

The principal causes of the deviations from standard are, then, cyclical fluctuations in business conditions, as reflected in the affairs of the company or industry being studied. The month-to-month comparison of the actual statistics with the estimated standards en-

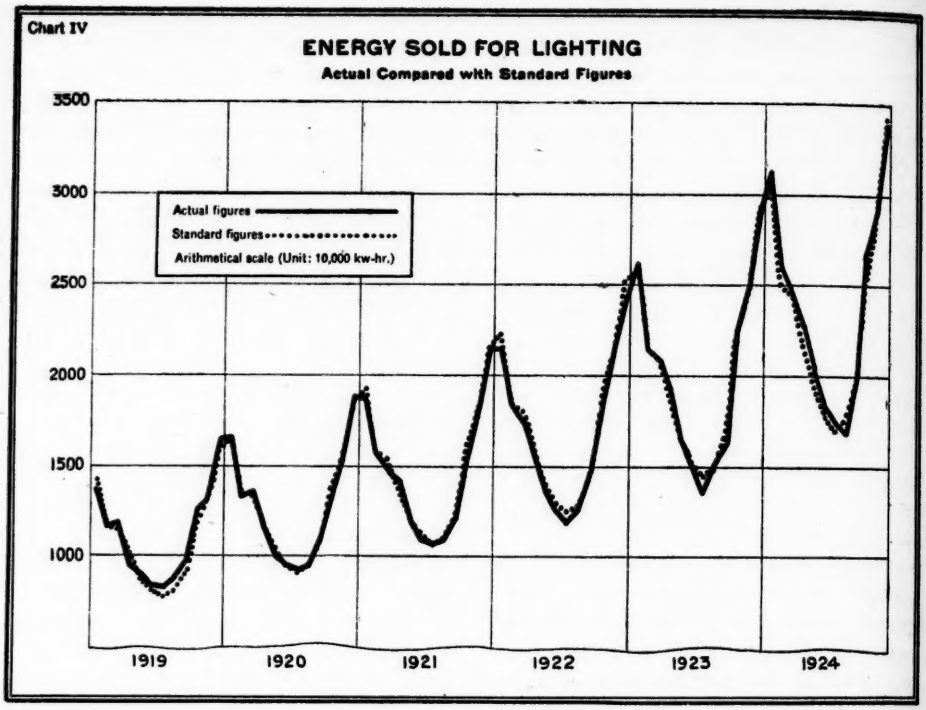
TABLE V. GROSS REVENUE FROM ELECTRIC SALES, COMPARISONS OF ACTUAL FIGURES WITH STANDARD FIGURES

A. DIFFERENCES, AND 12-MONTH CUMULATIVE DIFFERENCES, FROM STANDARD

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	—13	—50	35	—38	—77	—73	—93	—20	53	54	62	—130
1923	60	42	140	95	28	—36	—106	—63	—170	—21	—33	0
1924	189	184	216	196	77	—72	—74	—176	—103	—28	—104	—7
1922	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	—290
1923	—217	—125	—20	113	218	255	242	199	—24	—99	—194	—64
1924	65	207	283	384	433	397	329	316	383	376	305	298

B. PERCENTAGE RATIOS, AND 12-MONTH AVERAGE RATIOS, TO STANDARD

1922	99	98	101	98	96	96	95	99	102	102	102	96
1923	104	102	106	104	101	98	95	97	94	99	98	100
1924	106	107	108	107	103	97	97	93	96	99	97	100
1922	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	99
1923	99	99	100	100	101	101	101	101	100	100	100	100
1924	100	100	101	101	101	101	101	101	101	101	101	101



ables the executive to judge promptly and accurately the state of business as it concerns his enterprise.

Frequently the setting-up of standards for a particular enterprise can well be applied to more than one series indicative of operating activity. Table VI, Column 2 of Table III, and Table VII give the actual data, seasonal indexes, and standard figures for energy sold for lighting; and Tables VIII and IX give actual and standard figures for energy sold for power. In regard to the first series, the computation of the standard figures rests upon a compound-interest trend fitted to the data for 1919–24 and seasonal indexes which were derived by the ratio-actual-to-ordinate method.

For the second series the ordinates

TABLE VI. ENERGY SOLD FOR LIGHTING, ACTUAL DATA, BY MONTHS, 1919–24
(Unit: 10,000 Kw.-Hr.)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	1,378	1,167	1,189	953	903	824	831	871	982	1,242	1,333	1,637
1920	1,655	1,319	1,345	1,167	1,000	957	931	946	1,066	1,316	1,533	1,867
1921	1,858	1,562	1,480	1,410	1,172	1,087	1,055	1,080	1,208	1,528	1,834	2,144
1922	2,144	1,802	1,744	1,541	1,351	1,254	1,178	1,260	1,447	1,805	2,110	2,406
1923	2,621	2,154	2,077	1,901	1,634	1,508	1,349	1,498	1,613	2,232	2,517	2,883
1924	3,120	2,609	2,461	2,272	2,066	1,814	1,742	1,680	2,017	2,662	2,905	3,397

TABLE VII. ENERGY SOLD FOR LIGHTING, STANDARD FIGURES, BY MONTHS, 1919–24
(*Unit: 10,000 Kw.-Hr.*)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	1,404	1,155	1,129	1,007	882	818	785	806	917	1,178	1,342	1,580
1920	1,636	1,347	1,317	1,173	1,028	954	915	940	1,069	1,374	1,566	1,843
1921	1,908	1,571	1,534	1,369	1,199	1,113	1,067	1,096	1,247	1,602	1,826	2,149
1922	2,226	1,832	1,790	1,597	1,398	1,297	1,244	1,278	1,454	1,868	2,128	2,507
1923	2,595	2,136	2,088	1,862	1,630	1,512	1,451	1,490	1,695	2,178	2,483	2,923
1924	3,026	2,491	2,433	2,171	1,902	1,763	1,692	1,738	1,978	2,540	2,894	2,409

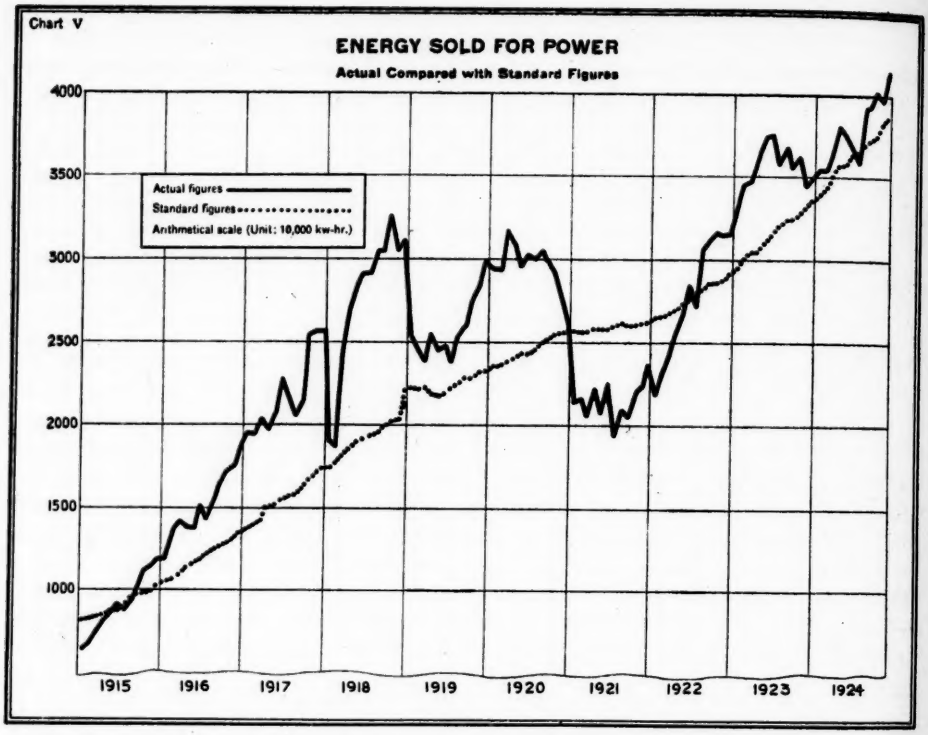
of trend are obtained from a *base series* rather than by the method of least squares. The base series represents a phase of the Company's situation which responds to the same trend influence as the energy sold for power but is much less responsive to cyclical influences. Examination of the data for 1915–24 indicates that the load connected for industrial power is an appropriate base series for the data of Table VIII.[5] The ordinates of trend, therefore, for the series of Table VIII, are the monthly items for industrial load connected, each multiplied by the factor 200/3. The need for this factor results partly from the difference in units for the energy and load series—kilowatt-hours for energy and horse-power for load—and partly from the fact that *normal* is always less than capacity in all lines of industry. As no appreciable seasonal variation appears in energy sold for power, the standard figures are identical with the ordinates of trend. It is clear that the projection of the standard in a case of this sort is less simple than where the trend is fitted by the least-squares device. Although the standard cannot be known definitely each month until such time as the connected load figure for that month becomes available, the great regularity which is found in the movement of the base series justifies projection for a moderate number of months.

Charts IV and V compare, for the

[5] Mr. H. H. Holding, the Company's General Power Representative, has used this base series in studying current activity.

TABLE VIII. ENERGY SOLD FOR POWER, ACTUAL DATA, BY MONTHS, 1915–24
(*Unit: 10,000 Kw. Hr.*)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1915	630	690	749	815	849	910	892	942	1,010	1,112	1,136	1,187
1916	1,191	1,355	1,403	1,394	1,377	1,514	1,430	1,556	1,655	1,715	1,773	1,879
1917	1,966	1,958	2,030	1,971	2,093	2,279	2,150	2,053	2,136	2,542	2,581	2,582
1918	1,913	1,887	2,429	2,700	2,852	2,906	2,916	3,047	3,066	3,271	3,066	3,126
1919	2,535	2,447	2,386	2,553	2,446	2,474	2,373	2,535	2,601	2,766	2,840	2,999
1920	2,935	2,932	3,191	3,104	2,956	3,029	3,001	3,063	2,993	2,928	2,742	2,608
1921	2,136	2,153	2,053	2,225	2,094	2,240	1,935	2,100	2,052	2,198	2,228	2,373
1922	2,177	2,298	2,424	2,548	2,677	2,847	2,728	3,086	3,110	3,180	3,166	3,164
1923	3,273	3,444	3,471	3,656	3,725	3,752	3,585	3,694	3,553	3,629	3,435	3,480
1924	3,542	3,541	3,648	3,801	3,758	3,683	3,592	3,909	3,929	4,028	3,970	4,165



two energy series, the actual with the expected figures, during the post-war years. It is obvious that these comparisons afford valuable information in addition to that given by Chart II or III.

The proper extension of this method of analysis to other series pertaining to the Company's operations might be expected to result in even more complete and specific knowledge of current conditions.

TABLE IX. ENERGY SOLD FOR POWER, STANDARD FIGURES, BY MONTHS, 1915–24
(*Unit: 10,000 Kw.-Hr.*)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1915	814	819	840	850	873	888	895	962	968	985	996	1,022
1916	1,043	1,072	1,093	1,124	1,145	1,182	1,208	1,237	1,259	1,271	1,304	1,341
1917	1,368	1,394	1,428	1,504	1,525	1,555	1,582	1,588	1,630	1,683	1,719	1,750
1918	1,750	1,796	1,821	1,858	1,905	1,915	1,947	1,960	1,991	2,021	2,035	2,202
1919	2,206	2,201	2,220	2,182	2,174	2,183	2,210	2,254	2,280	2,293	2,301	2,324
1920	2,349	2,368	2,394	2,400	2,415	2,428	2,453	2,490	2,511	2,542	2,553	2,567
1921	2,575	2,569	2,575	2,589	2,590	2,590	2,607	2,620	2,610	2,611	2,615	2,632
1922	2,652	2,657	2,682	2,706	2,735	2,765	2,799	2,833	2,859	2,871	2,890	2,918
1923	2,946	3,004	3,050	3,059	3,103	3,150	3,200	3,239	3,253	3,278	3,319	3,351
1924	3,381	3,432	3,500	3,569	3,594	3,632	3,662	3,701	3,730	3,761	3,829	3,862

TABLE X. TOTAL ENERGY SOLD, ACTUAL DATA, BY MONTHS, 1919–24

(*Unit: 10,000 Kw.-Hr.*)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	3,913	3,614	3,575	3,506	3,349	3,298	3,203	3,406	3,584	4,007	4,173	4,635
1920	4,590	4,250	4,536	4,271	3,956	3,986	3,931	4,009	4,059	4,243	4,275	4,475
1921	3,994	3,716	3,534	3,635	3,267	3,327	2,990	3,180	3,260	3,726	4,062	4,517
1922	4,320	4,100	4,168	4,089	4,029	4,100	3,906	4,346	4,557	4,985	5,276	5,570
1923	5,894	5,597	5,548	5,557	5,359	5,260	4,934	5,192	5,166	5,861	5,952	6,363
1924	6,662	6,150	6,109	6,073	5,824	5,497	5,334	5,589	5,946	6,690	6,875	7,562

II. Standards Derived from External Facts

Not infrequently a useful test of current performance within a company consists in comparing operating data with similar figures for the entire industry, or figures of even more general nature. Thus the operating activity of an electric company can be checked against like statistics for a group of generating plants, or against statistics of manufacturing or business activity. In all cases where the analysis discussed above in Section I is impossible, the use of external standards is the most logical substitute. Where internal standards are available, the use of external standards should not replace but may well supplement the analysis based upon internal data.

In the present problem, external comparisons should merely supplement those considered under Section I. To illustrate the method, Chart VI (derived from Tables X–XIII) compares energy sold by the Company with a similar series for all generating stations. The Company series is the aggregate of the "lighting" and "power" series discussed under Section I, and has been corrected for seasonal variation.[6] The external series was also corrected for its seasonal variation, but neither series is corrected for trend. The curves in Chart VI therefore represent

[6] The median-link-relative method, described in references mentioned in Footnote 2, was used to determine the indexes of seasonal variation. The correction for seasonal variation consisted in dividing each actual item, of Table X, by the appropriate index, to yield the adjusted item, of Table XI.

TABLE XI. TOTAL ENERGY SOLD, CORRECTED FOR SEASONAL VARIATION, BY MONTHS, 1919–24

(*Unit: 10,000 Kw.-Hr.*)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	3,490	3,510	3,540	3,620	3,560	3,510	3,640	3,700	3,820	3,850	3,900	4,060
1920	4,100	4,130	4,490	4,400	4,200	4,240	4,470	4,360	4,310	4,080	4,000	3,920
1921	3,570	3,610	3,500	3,740	3,480	3,540	3,400	3,460	3,470	3,580	3,890	3,960
1922	3,860	3,980	4,120	4,220	4,280	4,360	4,440	4,720	4,850	4,790	4,930	4,880
1923	5,260	5,430	5,490	5,730	5,710	5,600	5,600	5,640	5,500	5,630	5,560	5,580
1924	5,950	5,970	6,050	6,260	6,200	5,840	6,060	6,080	6,320	6,430	6,420	6,630

TABLE XII. TOTAL OUTPUT OF ELECTRICITY BY UNITED STATES GENERATING STATIONS,* ACTUAL DATA, BY MONTHS, 1919–24

(Unit: 1,000,000 Kw.-Hr.)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	.....	2,976	3,138	3,015	.....	.....	3,129	.....	3,166	3,419	.....	.....
1920	3,856	3,480	3,746	3,578	3,583	3,569	3,627	3,717	3,632	3,751	3,706	3,721
1921	3,541	3,166	3,395	3,239	3,264	3,244	3,270	3,411	3,375	3,574	3,639	3,820
1922	3,810	3,470	3,823	3,598	3,825	3,837	3,871	4,075	4,049	4,332	4,414	4,611
1923	4,754	4,324	4,728	4,473	4,653	4,523	4,536	4,670	4,535	4,950	4,838	4,956
1924	5,189	4,834	4,985	4,739	4,794	4,554	4,613	4,735	4,803	5,187	5,051	5,507

* Source of data, United States Geological Survey.

fluctuations due chiefly to trend and cycles. By comparing the two curves it is possible to obtain current information on the question: "Do these two factors yield results of as great intensity in the Company activity as in activity of the industry as a whole?" When both the Company series and the external standard can be corrected also for trend, the comparison reflects the relative influence of a single chief factor—the business cycle.

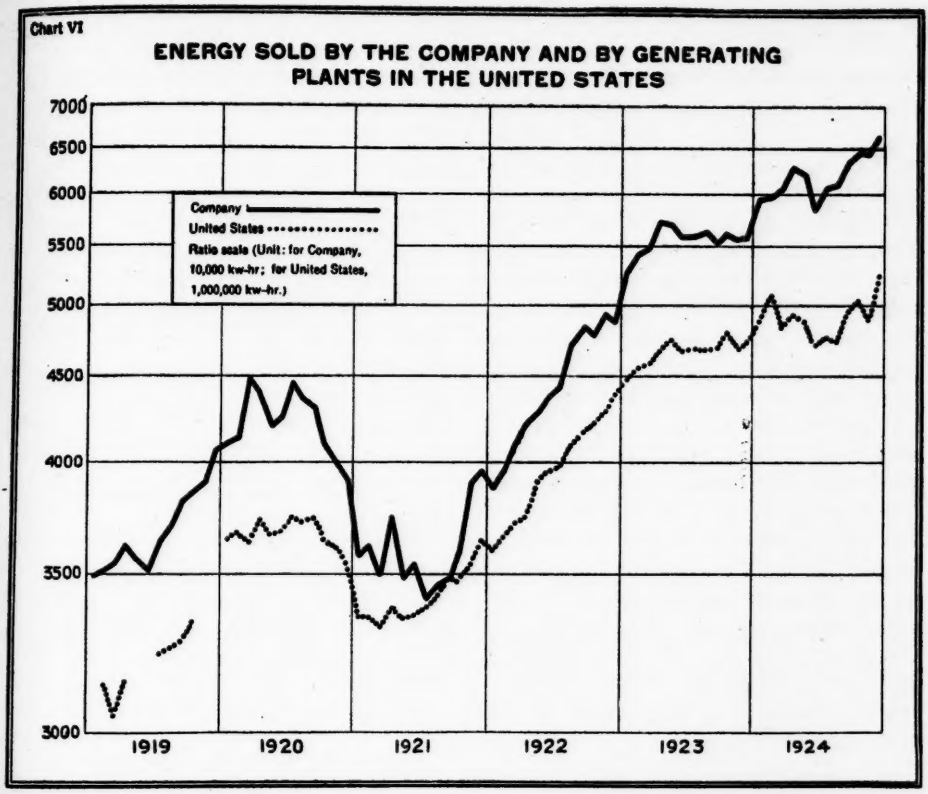
In a problem in which neither trend nor seasonal variation is existent or susceptible of measurement (and in which, therefore, no standards of the *internal* sort can be set up), the comparison with an external standard is still possible. Although no invariable rule can be given, it is probable that, even in this case, the standard should be corrected for trend and seasonal variation so far as possible. The comparison of the individual company performance with the external standard is made either by graphic or arithmetical devices.

It should be understood that, barring peculiarly favorable circumstances, such comparison with an external standard will scarcely be as valuable as the more highly refined measurements discussed above. In some instances the relation of the actual series to the external will be so remote and irregular that comparison is futile. For a particular company, the determination of standards should ordinarily commence with a study of the chief series of company activity, by the processes outlined in Section I. These general internal standards can well be supplemented by

TABLE XIII. TOTAL OUTPUT IN THE UNITED STATES, CORRECTED FOR SEASONAL VARIATION, BY MONTHS, 1919–24

(Unit: 1,000,000 Kw.-Hr.)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	.....	3,130	3,040	3,140	.....	.....	3,220	.....	3,260	3,320	.....	.....
1920	3,640	3,660	3,640	3,720	3,660	3,670	3,740	3,720	3,740	3,640	3,600	3,540
1921	3,340	3,340	3,300	3,370	3,330	3,340	3,370	3,410	3,480	3,470	3,530	3,640
1922	3,590	3,650	3,710	3,740	3,900	3,950	3,990	4,080	4,160	4,210	4,280	4,390
1923	4,490	4,550	4,590	4,660	4,750	4,670	4,680	4,670	4,680	4,800	4,690	4,720
1924	4,890	5,090	4,840	4,930	4,890	4,700	4,760	4,740	4,950	5,040	4,910	5,250



the use of specific internal standards pertaining to territorial or functional details of company activity; but the extension of the method is impeded by the fact that, as the analysis becomes more detailed, the series become more irregular and the determination of standards is therefore the less precise. The additional guidance afforded by external standards, provided they are available, serves to enlarge the executive's understanding of his company's status.

It would seem desirable, therefore, from the point of view of reliability and simplicity to depend chiefly upon the internal standard of company activity, supplemented, where necessary, by the external standard. The value of such analyses depends, of course, upon the use made of them. In the writers' opinion the internal standard gives a reasonably dependable basis for anticipating a company's operating requirements for the immediate future, and to some extent for the more remote future. Hence the determination of such a standard by the methods outlined above may profitably be included as an effective part of operating technique.

THE FIELD OF LAND UTILIZATION

By L. C. GRAY

SELF-CONSCIOUSNESS, in the ordinary acceptation of the term, is likely to develop much later than consciousness; and that form of scientific self-consciousness which we call "methodology" generally comes into existence long after the initial thinking, discussion, and experimentation in a particular field. The subject-matter of a field is not differentiated from other fields and not systematically defined and classified until long after the field itself has been more or less effectively explored.

So it is with the field of land utilization. In practice men have been struggling with problems of land utilization in the economic sense since the time when population density first made economy of land, as well as economy of labor, a consideration.

The theoretical analysis of such problems also goes back a long way, although generally it is not sharply separated from other lines of inquiry. To take one or two notable examples, we may mention Ricardo and Thünen. Ricardo's rent doctrine involved also a doctrine of land utilization. This doctrine of land utilization, as developed about the same time by Ricardo, Malthus, and Sir Edward West, and subsequently refined by their successors, was a notable contribution to the evolution of this field.

Thünen's *Der isolirte Staat* was essentially an elaborate doctrine of land utilization, and the work of his master, Albrecht Thaer, contained a good deal of discussion of the subject, though not welded into so formal a system.

In the middle of the seventeenth century Walter Blith set forth in verse a conception of a well-rounded system of land utilization:[1]

Go tell the World, of Wealth that's got with ease,
Of certaine Profit (gaine most men doth please)
Of Land Improvement to a Treeble worth,
A Five, a Ten-fold Plenty's here held forth;
The greedy Land-Lord may himselfe suffice;
The toyling Tenant to Estate may rise
The Poore may be enricht, England supply'd
For twice so many People to provide;
Though this a Paradox may seeme to you,
Experience and reason proves it true;
By floating Dry, and purging Boggy Land,
The Plough, old Pasture betters to your hand;
Directions to Inclose, to all mens gaine,
Minerals found out, Land rich'd with little paine;
Woods ordered so, in few years yeeld such store,
So large, so good, as you'le desire no more,
In fine, all Land in each Capacity,
In which it Lyes, made Pleasant to your eye.

Definition and General Scope

However, it is not the purpose of this article to explore the historical beginnings of land utilization, but rather to survey the field itself and consider its scope and boundaries.

Land utilization may be defined as *that branch of land economics which comprises the study of the land re-*

[1] *The English Improover, or a New Survey of Husbandry,* by Walter Blith, a Lover of Ingenuity. (London, 1649.)

sources of a nation or other geographical unit from the standpoint of their economic significance with a view to determining for what and how they may be most effectively employed.

At first this definition may suggest that the subject is mainly technological—that it belongs principally to such fields as soil physics and chemistry, scientific forestry, agronomy, or mining engineering. However, this is no more true of land utilization than of any other field of economic inquiry, with the possible exception of banking and finance. The economist working in any field of applied economics must take as a starting point the facts made available by physical science. The economist's task is to define certain economic objectives and interpret physical phenomena in the light of these objectives, usually, of course, with a view to conclusions as to action or policy.

In considering the scope of land utilization it is useful to distinguish between the surface and subsurface problems, for the subsurface uses, consisting mainly of the appropriation of minerals, generally do not compete with surface uses. Moreover, the subsurface resources, as contrasted with most of the surface resources, are essentially exhaustible—that is, to use them it is necessary to destroy them.

The surface resources again fall into two principal classes—those of the land and those of the water. For the most part, the uses of the one class of resources do not compete with those of the other class, though at some points there is overlapping, as in questions arising over the use of water for irrigation and in such questions as the advisability of draining swamps instead of leaving them in their natural state as breeding grounds for fish and game. The agricultural economist, of course, is most interested in the utilization of the surface land resources, and it is to this phase of the field that the greater part of the present discussion is devoted.

Without attempting an exhaustive catalog, the surface uses of the land include crops, pasture, forests, urban sites, sites for roadways, wharves, and other public utilities, and recreational uses. To some extent these uses overlap, as is seen in the complementary use of forests for grazing or for recreation. However, for the most part these various uses are mutually exclusive and competitive. This competition of uses is responsible for many of the problems of land utilization.

Like many other segments in the circle of modern scientific methodology, land utilization comprises a grouping of facts and theories about a single point of view, a point of view which is essentially pragmatic. That point of view is the use of the land resources of the nation in the most economic manner in order to achieve certain recognized objectives toward which the national economy is directed.

At the outset it is desirable to anticipate certain misapprehensions that may be aroused by this broad general statement. To seek the most economic use of land resources does not imply that the aim is maximum product per acre or even to devote the various resources to the "highest" use. It is elementary that such criteria are frequently not economic. The most economic use of the land resources implies also the most economic utilization of the labor and capital resources, taking into consideration the essential objectives of the national economy.

In fact, it may well be asked, why single out the land as a factor for special attention; why go further than the

single concept of production, which involves a well-directed and well-ordered organization of all the factors toward the attainment of the nation's objective? Clearly this question is basic, for it challenges the legitimacy of the field of land utilization.

Why Differentiate Land Utilization?

Without attempting an exhaustive statement of the reasons for differentiating land utilization from the general field of the economics of production, let me mention what appear to be a few outstanding reasons.

First, we may set up the very modest claim that such a differentiation is justified on broad grounds of scientific expediency which are particularly the necessity for division of labor and specialized training. Granting that land utilization is but a subdivision of production, it is an important and distinctive subdivision. The analysis of the field which is presented later will indicate that a very specialized form of technical training is desirable for work in this field, and that the field itself is broad enough to occupy the entire time of a group of specialists.

Intrinsically, however, the differentiation of land utilization rests on the special economic peculiarities of land as a factor of production. Perhaps no one of these peculiarities would be sufficient by itself, but taken in the aggregate they justify this differentiation. Land has a special juristic position as a form of property, and likewise, as a form of property the psychological attitude toward it is distinctive; land is a very definite category in economic evolution; its conservation is peculiarly vital to national greatness and continuity; it is, therefore, the basis of distinctive and characteristic public policies; the valuation of land is characterized by certain peculiarities, which may be less extreme than the classical economists believed but more distinctive than the extreme critics of the classical school would admit, and at any rate occupy a special position in the development of economic doctrines; and finally land has certain peculiarities as an economic good, such as immobility, spatial limitation, indestructibility, and existence in quantity greater than present demand requires, which characteristics are relatively, if not absolutely, distinctive in comparison with other classes of economic goods.[2]

Objectives of Land Utilization

It was suggested above that the economy of land utilization is determined largely by the politico-economic objectives of the nation. Probably it is not the function of the field of land utilization to define these objectives, but the worker in this field certainly should be aware of them, or if such objectives have not as yet been defined, then it is at least important to be aware of the various alternative objectives and of their relationship to the problem of land utilization. For example, is the present objective a maximum rate of population growth irrespective of the wastefulness of the process? Is the essential aim national self-sufficiency, or international interdependence, particularly as regards the immediate products of the land? Is a high average of individual well-being to be sacrificed to maximum population? Is agriculture to be given preferential advantages because of its peculiar significance in the national economy?

[2] It is recognized that the reasons given justify the differentiation of the more inclusive field of land economics, as well as its subdivision, land utilization.

These questions have received no deliberate decision in this country; probably they may never be deliberately decided. Nevertheless, a national attitude may develop more or less unconsciously, and is likely to be different at different periods. For instance, during most of our history our attitude has been favorable to extreme rapidity of population growth and national development, largely disregarding the waste of national resources involved in the process. This attitude has been in process of changing for a number of years.

If the field of land utilization does not bear sole responsibility for the formulation of the politico-economic objectives of the nation, it at least contributes largely to the information necessary for the intelligent determination of such objectives, as will be indicated by a consideration of the important lines of work included in this field.

Scope of the Field of Land Utilization

The distinctive task of this field, as suggested above, is to determine the proper allocation of the surface land resources of the nation among the various competing uses which have been mentioned, of which the most important are crops, pastures, and forests, making allowance for a certain amount of overlapping.

At the outset it is proper to inquire, why should we seek to determine this allocation of uses by more or less deliberate public policies instead of leaving the task to the silent forces of individual initiative? In reply it may be almost sufficient to point to the fact that one of these uses is forestry, and it has long been recognized that adequate provision for the needs of a nation in this regard is not likely to result from exclusive reliance on private initiative. Action must be taken with reference to forests, looking at least five or six decades ahead. It is most important to take this action with due reference to the land requirements of the other two uses, pasture and crops. To provide enough timber at present rates of growth to maintain our present rate of per capita consumption would require nearly three-fourths of the entire continental United States, which is considerably more than the humid area. We could also use more land for range grazing if it were available. In other words, on a basis of permanent forestry we have available less land area than we could make use of for all three purposes; therefore, economy in distribution among the three uses is desirable. It is especially desirable to avoid reforesting lands which will be needed in a few years for crops, or worse still, to devote to crop and pasture uses lands which are qualitatively much better suited to forests.

It is widely recognized that individual initiative must not be too largely relied upon to accomplish reforestation; it is not yet so widely recognized that private initiative, particularly speculative and commercial interests which profit directly or indirectly from the sale and settlement of land or from the expenditure of funds for reclamation, are responsible in large measure for the overexpansion of agriculture and for the misdirection of agricultural expansion. Furthermore, our excessively liberal land policy and the eagerness of pioneer farmers to profit from increased land values also tended to encourage overexpansion. Now that most of the public domain that has significance for farming purposes has passed into private ownership, the pressure of taxes and other carrying charges tends to force land into use too rapidly.

This tendency has been supplemented by the activities of real estate, commercial banking, and transportation interests which may profit at least temporarily from the settlement and development of specific localities, irrespective of the effect of such development either on the welfare of the nation as a whole or of the farmer as a class.

The farmers of the United States are too frequently the victims of the "booster" private interests and public policies of the nation, and the nation itself has suffered untold economic loss and wastage from the haphazard and planless process of agricultural expansion. We have become so habituated to this characteristic of national development that we have achieved a comfortable cynicism which accepts it as the inevitable cost of progress. One often hears that it "requires three waves of settlers to develop a new country," and we are heedless of the waste in property and in lives.

The field of land utilization presupposes the desirability and the possibility of a planned agricultural expansion. The primary task is to determine the proper rate of expansion by estimating the approximate agricultural area required under the prospective changes in population, standards of living, foreign trade, and productivity.[3]

The objective of such a task is not to attempt to control the current fluctuations in the prices of agricultural products through control of area, nor even primarily to control the long-time level of prices, although any deliberately planned program of expansion should involve an attempt to avoid overexpansion.

It would also be feasible to undertake successive steps of expansion with some reference to phases of economic cycles, in other words, to prevent the active creation and stocking of new farms at times of unduly high costs and in the face of prospective severe decreases in the price level. At any rate, it should be possible to avoid actively subsidizing agricultural expansion at a time when thousands of farms are being abandoned because they are unprofitable.

It is obvious, however, that although a program of expansion can be built on the fairly substantial and ascertainable basis of per capita requirements and average yields, as modified by probable changes in these factors, it is quite another thing to undertake a long-time forecast of such major fluctuations in demand as were produced by the World War and its aftermath. It is recognized that no such forecast can be made with absolute nicety, but careful foresight, based on a thorough investigation of ascertainable facts and modified from time to time, is preferable to blind blundering into the future.

With some intelligent estimate of the prospective requirements of land area for crops, pasture, and forests, the next step is to determine upon an annual policy for devoting our available area to the several uses, a policy which should have a certain amount of elasticity, as was suggested above.

The essential basis of this policy is a knowledge of the economic adaptability of our land resources. Many agencies are engaged in gathering physical information of one kind or another, such as the Weather Bureau, the Forest Service and state forestry commissions, federal and state soil surveys and geological surveys, the Biological Survey,

[3] For an attempt at a first approximation, see "The Utilization of Our Lands for Crops, Pasture, and Forests," in the 1923 *Yearbook*, United States Department of Agriculture. This article was prepared under the auspices of the Committee on Land Utilization, subsequently mentioned in this paper.

the Bureau of Fisheries, and fish and game commissions in the states. However, it is within the province of land utilization to synthesize these facts, supplement them as may be necessary, and give them an economic interpretation in terms of use. This is essentially a problem of economic coordination, and a problem that cannot be solved without a preliminary estimate of the requirements of the nation along the various lines previously indicated.

A Land Inventory

It has been recognized for some time that this phase of land utilization, which we may call land classification, is a prerequisite of a definite policy of land utilization. The process of land classification is not necessarily a nation-wide survey. Enough facts are already available to reach definite conclusions as to which of the three main uses would be most economical for the greater portion of our land area; it is necessary, however, to reach conclusions through assembling, mapping, and interpreting the facts. In the doubtful or marginal areas a field survey is probably necessary.

This need was recognized by President Harding's Agricultural Conference, which recommended a national land commission to deal with it.[4] No action has yet been taken, except for an act passed during the present session of Congress giving the Bureau of Reclamation, Department of Interior, authority and $100,000 to study irrigable, drainable, and cut-over lands, presumably with a view to their reclamation. However, it is desirable to mention certain beginnings that have been made in the direction of systematic land classification.

One of the most notable is the Michigan Land Economic Survey inaugurated in 1922, which is directed by the Department of Conservation, but which involves the cooperation of a number of state and federal agencies.[5]

These surveys appear to have passed through the experimental stage, and methods have been fairly well standardized. The costs have been gradually reduced, so that the latest surveys average about 2½ cents per acre. When a million acres of land, which is at present an economic liability to the state and nation, can be so thoroughly explored for $25,000 as a means of determining the most feasible mode of utilization, the investment would appear well worth while. The real test of the Michigan surveys will come in the use made of the information. Courage and vision will be required to interpret the facts, formulate definite policies both for public and private action, and then insistently apply these policies.

The second line of work which I would mention is that of the United States Department of Agriculture Committee on Land Utilization, which comprises representatives from various bureaus of the Department. This organization operates on the assumption that a vast amount of material with reference to any important undeveloped region has already been collected by the various bureaus of the Department or other departments, as well as by state institutions. The committee is striving to promote the cooperative task of synthesizing these materials, looking to-

[4] Report of the *National Agricultural Conference* (Washington, Government Printing Office), 1922, p. 179.

[5] [EDITORIAL NOTE.] For a more detailed analysis of the Michigan Land Economic Survey, see article by P. S. Lovejoy, "Theory and Practice in Land Classification," in this issue of the JOURNAL, p. 160.

ward the definite formulation of a land utilization policy for various regions. After the available materials are brought together and interpreted, supplemental field studies of the sampling type are undertaken. It yet remains to be determined whether this method of land classification can be made a substitute for the intensive survey of an entire region, which is the method used in Michigan. At any rate the systematic interpretation of already available material should precede the survey and may well economize considerably the cost of the latter process. Thus far land utilization studies have been made for the northern and central Great Plains, the "piney woods" region of the Southern Coastal Plain, and to some extent for the northern portions of the Great Lakes states.

It is important to recognize that studies of this type should enlist the cooperation of federal, state, and local agencies. The determination of a proper land utilization policy involves not only local questions but such national considerations as foreign trade and foreign trade policy, transportation policies, the outlook for foreign markets and the trend of foreign production, the military outlook, population trends and trends in national consumption, forestry, drainage, irrigation, and waterway policies, and a number of other matters of nation-wide significance. Moreover, the general interests of the nation in these matters are likely to be more or less in conflict at a number of points with the specialized interests of localities.

Lacking a broad federal policy or even a state policy, it will not be surprising to find individual localities, such as a county, undertaking a thorough survey of natural resources in order to formulate a well-rounded policy of utilization. As a matter of fact, the nation and the locality have many common interests in this task, and the cooperation of localities vitalizes the project and makes more possible the application of policies after the policies themselves are determined.

Indeed, what differentiates land utilization from descriptive economic geography is the fact that its primary aim is the development of policies for the most effective use of the land. The information collected and organized must be translated into definite policies of use, and these, in turn, made effective by legislation or through the influence of ample publicity and extension work.

Theoretical Problems in Land Utilization

In establishing the position of land utilization it may be helpful to make clear that the subject comprises not merely an assembling of facts oriented by a definite point of view, but also a body of theoretical doctrines—in short, that it may make a fairly good claim to standing as a scientific discipline.

The task of separating from the fabric of economic doctrine the various threads that relate particularly to land utilization and of weaving these threads again into a distinct pattern, which will be a complete and satisfying whole, is yet to be accomplished, but the threads themselves are there, and in sufficient quantity to make a fairly complete garment. I may illustrate by mentioning such theoretical problems as the following:

1. How determine the margins of utilization as between crops, pasture, and forests?

2. How is the determination of the economic margin affected by the perishability of the use-bearer?

3. To what extent should a nation, as distinguished from a private individual or company, consider the discount on the future in formulating a policy of utilization?

4. What is the point of most economical intensity of use for the various possible uses, and how far are the interests of private enterprise, of the locality, and of the nation as a whole in agreement on this point?

5. What criteria should determine the politico-economic objectives of the nation with respect to the use of its land resources, and what relative weight should be given the several criteria?

6. How do different methods of taxation influence utilization under various types of uses?

This statement of a few of the lines of theoretical inquiry, rather generalized for the sake of brevity, suggests the theoretical scope of the subject. In spite of much discussion of these and related problems, it must be confessed that our theoretical guidance in the field of land utilization still leaves much to be desired.

THEORY AND PRACTICE IN LAND CLASSIFICATION

By P. S. LOVEJOY

SOME sort of conception as to the nature and function of land classification appears through all the history of our ragged land affairs. In the regulations for the original land surveys, the surveyors were required to indicate the approximate boundaries of the major land types: prairie, swamps, rough and mountainous, forest and the character of forest. Sometimes "agricultural" and "non-agricultural" lands were delimited. The grants to railways provided for a species of classification intended to segregate mineral from non-mineral lands.

The general land laws under which title to public lands passed to individuals provided, in theory at least, for the separate entry and handling of lands presumably of chief value for farming, for timber and stone, for minerals, and the like. From time to time distinctions were drawn between different types of mineral formation, and between prairie, desert, grazing, and still other forms of homesteads.

The presumption behind the land laws was that individuals would select and file on, and subsequently utilize, each class of land for the purposes indicated by the law under which the entry was made, and that land utilization would therefore proceed in a fairly orderly and intelligent manner.

Classification in the Pioneering Period

During the pioneering period, say up to 1900, official attempts to identify and administer the disposal and utilization of the several types of land were superficial or mere pretenses. To the extent that we had any general land policy it was based on the notion that there was enough of everything to satisfy everybody—and first come first served.

But if there was no real attempt to administer land affairs on the basis of official and specific land classification, a very real and very intimate classification of land was nevertheless being accomplished. It was accomplished by the trial and error of millions of individuals exercising whatever of information and judgment they possessed. Land of all sorts was taken up and utilized without expectation or desire for advice and assistance from any official sources.

This phase in our land affairs terminated when it became evident that, without some manner of assistance, individuals could no longer maintain the continuous "development" of agricultural lands then looked upon as desirable and necessary.

From the adage that "Uncle Sam is rich enough to give us each a farm," by 1900 we had proceeded to the standard assumption that the government, federal or state or both, owed each of us a farm or its equivalent in natural resources.

The Land-booming Period

Now begins the land-booming period characterized by its deliberate and varied stimulation of land utilizations.

Through the Reclamation Act of 1902, the Federal Government put its

engineers and funds at work on enormous irrigation projects which, the public was assured, would make the desert blossom. That this blooming was really booming did not appear until 20 years later. In order to proceed with reclamation, the engineers surveyed and selected the sites they would develop. That their classification of sites was incompetent, and failed to take adequate inventory of geology, soils, agronomy, and economics, in time became evident enough.

Meanwhile, various other activities involving some manner of land classification were going on.

By 1906 a system of national forests had been created and placed under an administration which, from the first, specifically recognized that its chief function was to further and maintain a "wise utilization" of the lands in its charge. The classification and mapping of national forest lands began at once. At first rough and ready, presently there was developed a definite technique under which areas "chiefly valuable for agriculture" were identified and eliminated or opened to homestead entry. In this work a new precision in the classification of agricultural and non-agricultural lands was devised and calculations as to the "expectation value" of given tracts, on the basis of information available at that time, were required.

Detailed inventories of grazing and timbered areas were presently under way, each under its own new and precise technique, and as rapidly as such data became available, they were absorbed into the current administration of the lands.

During these years Roosevelt was "withdrawing" coal, oil, phosphate, and water-power areas, each type and case requiring something in the way of specific surveys and determinations as to the boundaries of lands of given character.

By this time the different regions and states were beginning to realize the extent and implications of their idle lands, and, with the railways and a great variety of local organizations, one after another joined the procession of land boomers. "Colonization" firms and "land-sharks" multiplied astonishingly and almost every county containing idle land became lyric in baiting for land-buying settlers. Where lands were already well settled, chambers of commerce and development associations boomed hopefully for industrial projects which might increase the local payrolls.

About 1910 all this booming reached its peak and began to generate a reaction, part of which, no doubt, appeared in the steady growth of the "conservation" doctrines and programs.

Badly obscured, at times, with emotional or political considerations, the essential issue between "conservation" and "development" gradually became clear. The one insisted upon "wise use" of land: the other merely upon "prompt use."

Whether recognized or not, bedded into the conservationist's point of view was the new element which presently terminated the period of booming and which, about 1920, began to generate the present phase in our land affairs.

Present Phase in Land Affairs

The land-booming period ended as it became evident that the long-dominant theories and practices had failed to accomplish the desired ends. In spite of all the stimulations, the aggregate of unproductive lands increased. Simultaneously it was discovered that the development of agricultural lands had been excessive. As the penalties inci-

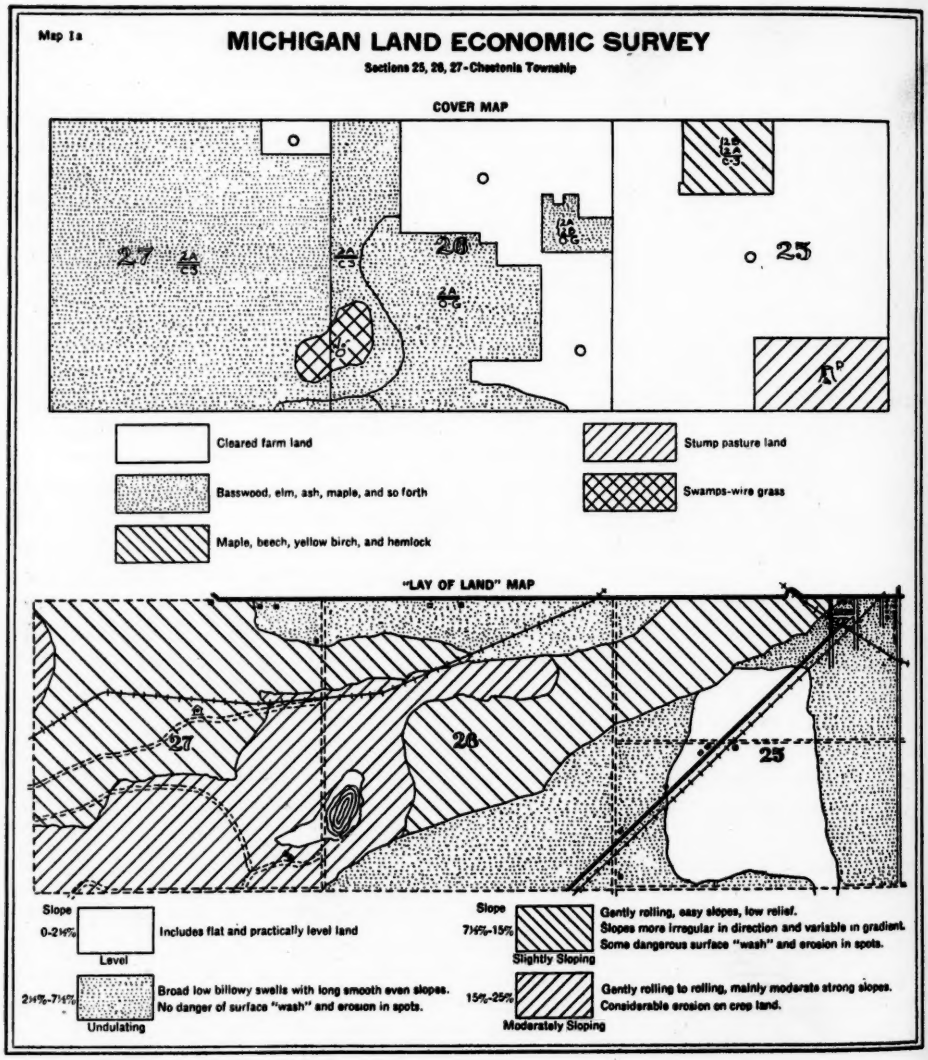
dent to the unwise use of land became evident, accent upon the necessity for wise use increased.

"Wise" use of land necessarily implies and presupposes a competent isolation, consideration, and balancing of the factors which limit or affect the successful utilization of land.

The present phase in our land affairs is characterized by a sober effort to appraise and order the factors which limit or affect land utilizations. The nature and function of wholesale land classification now, and for the first time, begin to receive real consideration.

Growth of the Classification Idea

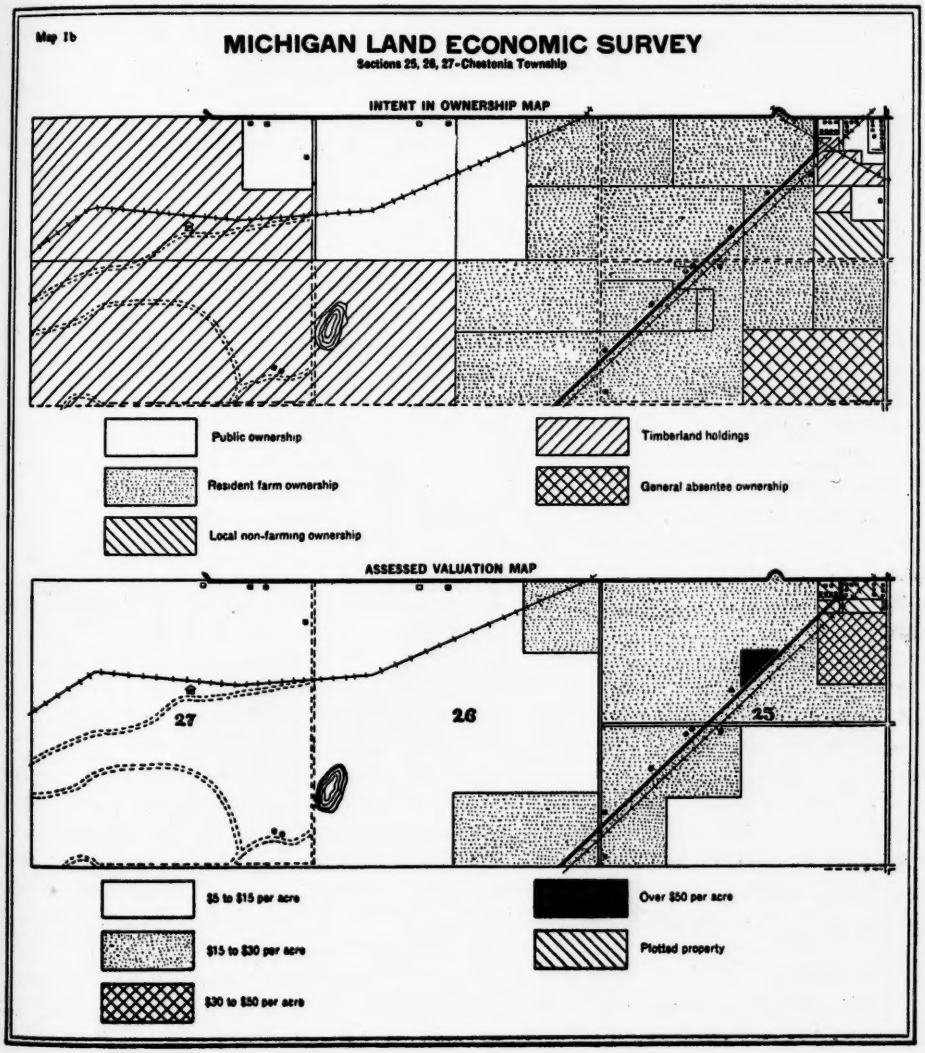
Fearing the results of wide-spread unemployment as the war ended, the Sec-



retary of the Interior in 1918 proposed a new and magnificent plan; namely that the Reclamation Service should direct the manufacture of farms for soldiers and sailors, by the drainage of swamps and the clearing of cut-over lands, as well as by irrigation projects.

A reconnaissance of the lands available for such development having been authorized by Congress, the first attempt to canvass the whole situation was made. The reports, published in 1919, proved astonishing to the authorities from whom the nation was accustomed to accept leadership in land affairs.

It was shown in these reports that toward a quarter of our entire land area had become "wild" stump land; that the cost of reclaiming desert and



swamp land for agricultural purposes as a rule exceeded the cost of clearing stump land. The bulk of the land yet subject to intensive agricultural utilization was found to be in the eastern, and humid, half of the country. It was even admitted, reluctantly and in guarded language, that only a small fraction of the stump lands could be considered "fit" for early agricultural development. This analysis made in 1919 holds true today.

This preliminary field inquiry was supplemented by a statistical inquiry as to arable and other lands, published in the 1918 *Yearbook of the Department of Agriculture*. With the publication of this paper the professional land economist (under the title of "Agriculturist") first appeared in our official proceedings as to land affairs.

The returns from the 1919 census next became available and, while confirming the data as to idle lands, showed that the shrinkage in improved farm lands, long so typical of New England, had spread south and west until over 20 states were affected.

There is every evidence today that this is no temporary condition; the shrinkage of old improved farm land promises to intensify and continue spreading.

Here, and again, is proof that one sort of land classification has been steadily in progress through many decades. Lands which have been unwisely used are being identified indeed.

A Division of Land Economics, staffed by professional land economists, was next created in the Department of Agriculture and a steady flow of technically competent data as to the history, status, and future of our major land affairs began.

This marked a transition from the "boomer" period to that which was to follow. In the same breath the Secretary of Agriculture reported a staggering overproduction of farm products, an alarming aggregate of idle land, and a dangerous depletion in forest products. A special committee of the House investigated the agricultural crisis. A special committee of the Senate investigated forest depletion. Both crisis and depletion were amply confirmed.

Last spring it was officially admitted that many of the federal irrigation projects are insolvent and that some are bankrupt. State and private colonization and development organizations are generally in no better situation. The long continued boom was by this time well punctured and the booming period ended.

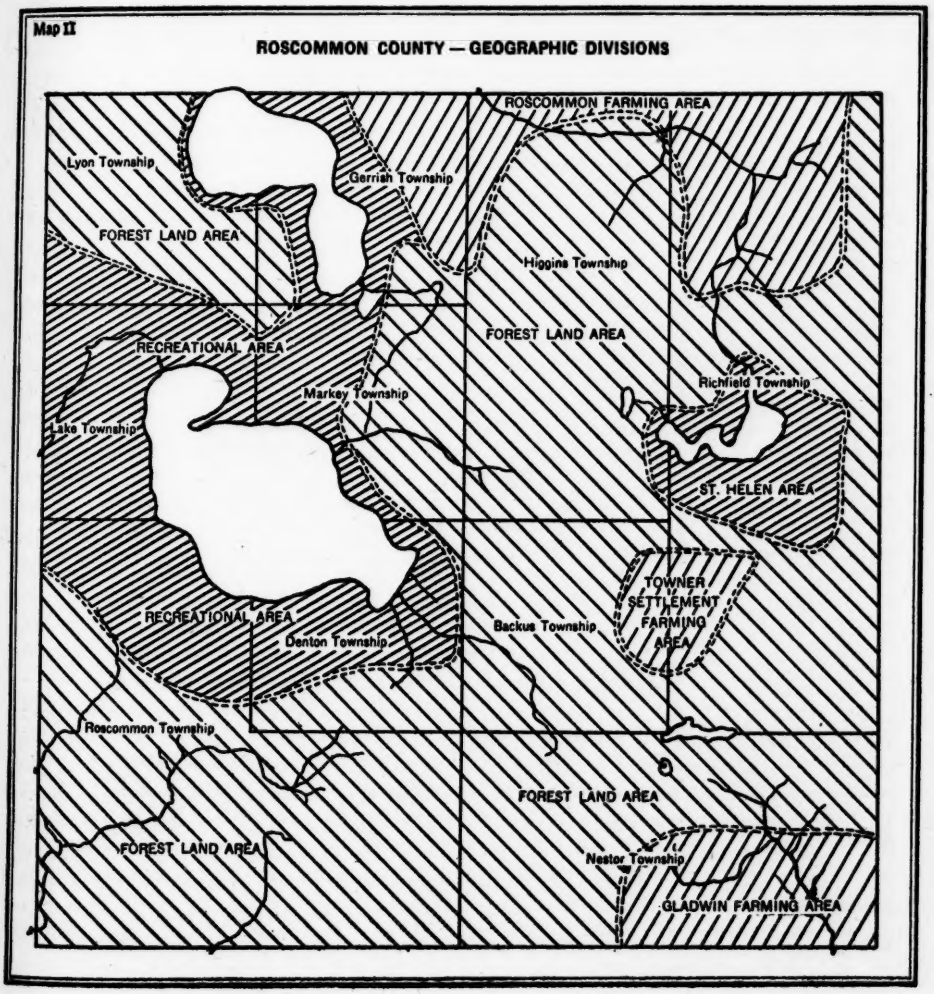
In 1922 President Harding assembled his "Agricultural Conference" and there the nation's greatest authority upon land economics discussed the imperative need for a genuine and competent general land policy. Said Dr. Richard T. Ely: "No land policy is worthy of a moment's consideration that is not based upon the classification of land. Let us place, therefore, first of all, land classification * * *. It is imperative to classify land with a view to determining what areas should be devoted to crops, to grazing, to forests, since we must have distinct policies for each one of these kinds of land * * *." In its final resolutions, the Conference echoed this dictum.

It was again echoed in the final report of a special committee representing the several branches of the Department of Agriculture. The departmental *Yearbook* for 1923 recited that even when allowance has been made for anticipated increases in population, enough arable land is available to assure us adequate supplies of agricultural staples, but that the deficit in forest products grows

apace, and to assure the nation adequate supplies of reasonably priced forest products will require an acreage of continuously productive forest lands so great as to absorb all the forest land available.

This classic report concluded that "the areas that are to be devoted to reforestation, as well as the areas that should be reserved * * * for pasture and crops, should be determined by deliberate selection * * *. To this end a systematic classification of our reserve land area is requisite."

With this conclusion and admission, the methods and points of view of the land economist at last dominated and superseded the methods and points of view of the technical agriculturists who, all these years, had permitted confidence in their technical skill, and undue optimism—if not illusion—as to the economic practicabilities of agriculture, to bolster the assumptions, allegations, and



subreptions of professional land-boomers.

The new period in our land affairs is now well opened. It will be characterized by deliberate and more and more competent inventory of lands and of the factors which limit or affect the use of land.

Moreover, it will, I believe, become increasingly apparent that a land inventory is one thing, that land classification and planning for use is another thing, and that putting the plans into practice—the political science or engineering of land utilization—is still a different thing. The three operations are quite distinct; yet all are necessary to achieve intelligent land utilization.

The inventory proper in the case of land should be like any business inventory, as, for example, in the physical valuation of the railroads; it should "express no opinions, offer no advice, and make no plans," but it should assemble all the essential data requisite to the formulation of adequate and workable plans for the utilizations involved.

Land classification, on the other hand, involves the making of specific plans for the lands reported upon by the inventory on the basis of the facts found by the inventory. Classification and land planning go hand in hand, for classification is essentially purposive; it looks to the attainment of some end and hence includes planning.

On the basis of the inventory and the classification, there remains the difficult task of transforming the plans into actualities—of putting the theories into practice—or, to phrase it another way, of getting policies in operation.

In the present phase of our land affairs we have not clearly distinguished these three essentially different operations, but rather tend to bulk them all under the term, "classification."

The general formula is now to the effect that land utilization should be preceded by a competent land classification. It is recognized that development should be predicated upon a full knowledge of the limiting factors and that these factors should be balanced in advance.

Federal Agencies Classifying Land

But what agency can or should conduct land classification work of this order?

The United States Geological Survey maps topography in great detail and sometimes indicates "woodland"—in a single shade of green. But it does not attempt to report upon the character, value, or prospects of the woodlands mapped, nor does it make any record as to agricultural or other utilizations in the mapped areas. One may guess at the nature and extent of utilization only from the civil-base data such as roads, buildings, mines, and the like.

The United States Bureau of Soils, however, maps soils in great detail, and, sometimes, roughly indicates types of topography. The soil maps are based on taxonomic classifications and do not indicate anything as to the location and extent of areas under actual cultivation or in forest. In the reports which accompany the maps, climatic data as they may affect orthodox agriculture are included and a few bare figures as to agricultural production are borrowed from the census, but as to the items of economics, silviculture or economic biology involved in the utilization of the lands being mapped, nothing is known or said, even when the bulk of the mapped area is certainly dubious or hopeless for agriculture.

When the United States Department of Agriculture conducts a "farm-man-

agement survey" it proceeds to record and analyze the details of family and labor income, computes interest rates upon invested capital, and may take note of the size of farm units; but only passing reference, if any, is made to the soil types in which the farms happen to be located, and no inquiry into the percentage of used and idle land in the neighborhood, or the like, is considered pertinent.

The United States Biological Survey, the while, conducts its own style of surveys, and may chart the ranges of rodents and wildfowl, but cannot say as to the normal carrying capacity of typical ranges in terms of deer, beaver, or quail, and has made little, if any, inquiry as to the relative stocking of ranges and habitats, and the reasons therefor. And so on.

Land Classification in Michigan

If the federal departments and bureaus are unable or unwilling to undertake the specific classification of land as contemplated by economists, the state organizations, as a rule, are in a still worse situation. For such work there is no precedent; in various quarters there is active suspicion or prejudice; the new notion may upset ancient procedure and may change the relative importance of various official activities —and appropriations.

As it happened, Michigan became the laboratory for the working out of land classification technique and its wholesale application in the field.

In 1919 the Michigan Academy of Science, disturbed by the great and growing acreage of idle stump land in the state and region, and having long observed the futility of all existing procedure, undertook to formulate the necessary devices.

In 1920 the Academy considered and adopted the report of its special committee. Having asserted that an inventory of the idle-land districts was necessary, the specifications for such an inventory were also listed. These, as stated, must include adequate information as to (1) physical conditions, such as soil, climate, cover; (2) economic data, such as history and status of existing utilizations, trend of population, tax and fiscal affairs. In addition it was held that such an undertaking "should utilize, to the full, the scientific personnel of the state, and, if feasible, the cooperation of the appropriate federal agencies." [1]

Up to this point little more than academic formula had resulted, but, presently, through the well-focused efforts of many interested individuals and organizations, an old statute authorizing a "Soil and Economic Survey" was invoked; cooperation between the University, the Agricultural College, and the State Departments of Agriculture and Conservation, was arranged, and funds for experimental field work became available. Lacking all adequate precedent, it was realized that the first work must be considered as experimental. The practicability of such a composite survey must be tested and proved.

When the first field season had demonstrated the complete feasibility of the general plan and the urgent need for such inventory work, the State Department of Conservation adopted the new "Land-Economic Survey," provided

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[1] *Twenty-second Report, Michigan Academy of Science,* 1920, p. 2. These specifications were written by Dr. C. O. Sauer, now head of the Department of Geography at the University of California. Dr. Sauer was also responsible for the development of the field work in land economics, as presently undertaken.

funds, and continues to operate the survey.

To date the Michigan survey has covered some one and a half million acres of typical "cut-over" country—five counties. Its technique has been modified by experience but has become more precise and detailed rather than more general, and is now fairly stable and quite satisfactory to those in charge. The technique now in use has been worked out in cooperation with the United States Bureau of Soils, the United States Lake-States Forest Experiment Station, and many other agencies, federal and local.

It should be noted that the survey has had a wholly free hand in devising and developing its procedure, in selecting its permanent personnel, in selecting the first areas to be worked; and that it has had ample funds.[2]

Inventory Precedes Classification

The essential difference between the Michigan Land-Economic Survey and all previous undertakings lies in its deliberate effort to discover and record all the essential items upon which the intelligent utilization of the lands must be based, to take account of the several variables at the same time, and to do these things without bias or prejudice respecting different or competing forms of use. In brief, the Michigan survey has established the inventory as a prerequisite to classification and planning.

In northern Michigan (as also through the bulk of the cut-over regions located elsewhere and now involving a total of some 250,000,000 acres) it has long been quite obvious that successful utilization of the land must come through agriculture, forestry, or (and) "tourist traffic"—that is, development and utilization of recreational resources, such as scenic, aesthetic, hunting, and fishing resources.

Industrial uses of land, water-powers, mineral developments, and the like, important and feasible as they often are, will at most utilize but a small fraction of the total acreage involved. It is, therefore, a case of farms, forests, and recreation—or nothing; with "nothing" signifying w h o l e s a l e bankruptcies. (Some 700,000 acres of tax-delinquent land have already reverted to the State of Michigan.)

In theory, perhaps, a fully competent staff might survey these lands and proceed to their "classification." A specific rating might be given each type or parcel of land so as to indicate its presumed availability for farm, forest, or recreational utilization, or its rating in each factor which is presumed to be involved. But any such attempt at specific ratings implies the exercise of much personal judgment on the part of the survey staff, or implies wholly arbitrary, and therefore unsatisfactory, definitions and distinctions—or the gift of prophecy.

No such form of "classification" might hope to stand. The variables which affect or determine the precise time and manner in which given lands should or will be developed, are very numerous and in constant flux; some of them, no doubt, are yet to be identified and named.

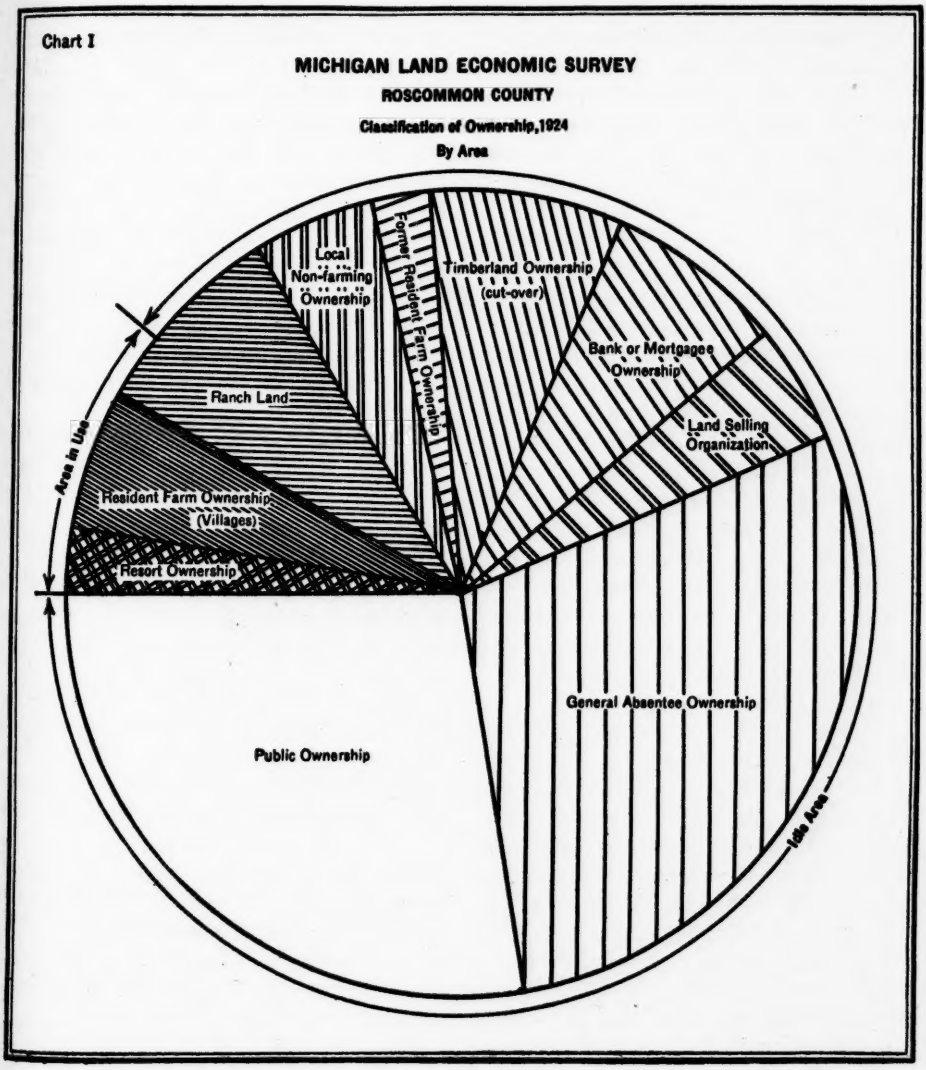
Furthermore, the bulk of the lands in question are in private ownership and "the equities in real estate are sensi-

[2] John A. Doelle, as State Commissioner of Agriculture, now vice-president of the Federal Land Bank at St. Paul, was chiefly responsible for the first cooperative arrangement under which the survey started. John Baird, Director of the State Department of Conservation, has been chiefly responsible for the later financing and undisturbed progress of the survey.

tive." Local owners and communities have needs, ambitions, hopes, and, like enough, illusions—sometimes of fanatic intensity. To raise, invite, or permit wholesale debate as to the accuracy or justice of comparative ratings would precipitate endless and violent controversy, between technical experts as well as among laymen and politicians.

Facing the problem in the field, the survey staff presently decided after lengthy consideration that no such "classification" was practicable, if at all possible. Still the essential facts must be secured, presented, and given wide publicity, and, if possible, this must be done in a manner permitting no legitimate question of their fairness, authenticity, or significance.

In this contingency the words "clas-



sification," "agricultural," and "non-agricultural," and their related conceptions, were dropped by the survey staff. In place of "classification" the word and the concept of "inventory" were used. Classification implies a more or less specific rating of quality or value, and this rating involves some official discrimination, assignment, or dedication, all of which are repugnant to American psychology and experience. But inventory implies only an orderly assembly of incontrovertible and pertinent facts.

In their extremes it is, of course, evident that agricultural and non-agricultural lands may be identified as such. But "absolute" forest and other lands shade off by imperceptible degrees into marginal conditions in which the boundaries may shift constantly. The technical possibilities of crop adaptations and the economic practicabilities of land utilizations cannot be definitely equated, at least in the relatively level areas typical of the northern cut-over regions.

In the territory thus far inventoried by the Michigan Land-Economic Survey, the lines between super-marginal, marginal, and submarginal lands seem to be indicated with even greater precision than was to be hoped for and without involving any form of arbitrary or debatable assertion. In this, perhaps, lies one of the most important discoveries of the Michigan survey.

The first problem of the survey was to identify the "essential" data upon which the intelligent utilization of the lands might and must be based. The next was to devise ways and means for getting such data and for presenting them in easily available forms. Simultaneous surveys to take adequate inventory of farm, forest, and recreational resources must be made and supplemented as necessary. Field experience with the new technique must demonstrate its practicability in respect to personnel and costs. All this has seemingly been accomplished.

Procedure of the Survey

The procedure now in use is so novel and so varied that without reference to the maps and reports it is difficult to describe it in any detail. Publication of survey data has not yet been practicable or desired but will doubtless begin in the near future.

Without attempting to record the details of cooperation and organization, the general procedure of the survey is about as follows:

The permanent staff consists of highly trained, experienced professional men: a forester, a soil surveyor, a land economist, and two general utility aides.

Specialists in water-power, economic and glacial geology, peat, anthropology, and so forth, are available and are called in as needed.

The major work consists of three simultaneous surveys which include (1) civil-base data—topography, cover, and utilizations, (2) soils, (3) land and related economics.

Field work is done on a scale of 4 inches to the mile and requires a total summer crew of about 20. Total costs of the field work, not including contributed work for which the survey does not pay, are running about 2½ cents per acre.

Inventory of Civil-Base Data

The civil-base map shows the land net; streams and lakes; roads, buildings, and other improvements, and, where important, their quality and condition, especially whether used or abandoned.

Topography is shown in five classes,

from level and in need of drainage to very steep and broken. Contours would be preferable but proved too costly for the present.

"Cover," as shown, includes forest, swamp, grass, and other forms of "wild" growth, and also all lands under any defined forms of agriculture or other utilization, such as tilled, orchard, pasture. Abandonments are shown as such.

The precision with which the several forms of cover are recorded is much greater than can be indicated here. The cover symbols number nearly 50 and permit of indefinite combination to express almost any possible, and all important cover complexes. Units down to 10 acres are shown.

Forest growth, and whether the growth is original or secondary, is recorded under a system worked out in cooperation with the United States Forest Experiment Station. The maps indicate the species in the mixture, their relative importance, stand density ("thick, medium, thin," and so on) and the prevailing diameter ranges (which of course correlate to ages).

When the maps are planimetered, the total acreage of each typical or important forest growth and condition can be tabulated for species, density of stocking, and size or age. Growth studies in stands shown by the maps to be typical and important are being made. When the results are available, for any given area or land type, it will be known what volume and quality of forest products are to be anticipated in the normal course of events. Annual revisions of the cover maps, by fire-wardens, county-agents, and others, should keep the maps up to date without difficulty.

In cases where artificial reforestation will be needed if certain areas are to become reasonably productive in the near future, very little additional work will be required in order to initiate whatever planting work may be decided upon, since the soil and cover conditions are shown, and the original forest and history are reported, with notes by the staff forester as to planting.

The classification of forest and other wild growth was worked out in cooperation with professional biologists as well as with foresters. As this phase of study has been handled, it is readily translatable into terms of wild-life habitat, which, as in the case of forest products, can be (and is being) given technical analysis in order to determine the carrying capacities, degrees of stocking, and limiting factors in the biological complex which must be understood and balanced before deer, beaver, trout, or partridge populations may reach, or be held at, anything like their maximums. The work in economic biology is being done by specialists attached to the Department of Conservation but not directly associated with the survey proper.

To link cover and wild-life with recreational resources, the character of stream and lake shores and bottoms is recorded by the survey, together with beaches, favorable building sites for summer resorts, and similar features.

In the larger water areas, approximate depths, bottom conditions, and the character and location of aquatic vegetation are mapped. (Rooted vegetation is the best single index as to the fish-carrying capacity of waters, and terrigenous formations have important relations with spawning habits and opportunities.)

With aquatic habitats mapped, the specialists in fish-culture will know the location, mileage, and acreage of the several characteristic combinations, can plan the order of technical investiga-

tions needed to refine and apply the base data, and can adapt their planting and other field operations with a certainty of success that has been long wanting and previously impossible.[3]

As the mappers (who in average country cross twice through the section, thus getting within a quarter-mile, or less, of everything they map) draw in cultivated areas, they show separately the lands under actual cultivation, those seemingly abandoned, and "temporary" and "permanent" pastures. Permanent pasture is considered to be such land as will never permit of tillage, for reasons such as topography and stone. Temporary pasture is of such character as to permit of intensive cultivation when cleared. Since "stump-pastures" represent the normal transition between wild land and intensive cultivation, and will quite certainly be cleared and in cultivation before any considerable areas of wholly "wild" land will be reclaimed for agriculture in that vicinity, the ratio of "temporary pasture" to tilled land, and the rate at which improved land in the district has been increasing during recent decades, will give unusually precise data on which the probable rate of increase in improved lands may be anticipated; and, by direct implication, these data will also indicate the probable demand for raw farm lands during the next decade or two.

Settlement and colonization plans as well as land-clearing programs and the like, if they are to be justified at all, should be based upon dependable information of the sort indicated.

During the field work, the mappers keep a running tally of the important farm crops actually found growing. This tally is made field by field. When the maps are finally planimetered and the total acreage of crop land is determined, the percentage of the total represented by each field crop, and the consequent acreage in each crop, becomes known. Taken in connection with the figures for car-lot exports and imports of farm staples, which are secured by the land economist, current crop practice and the actual status of each of the agricultural staples, as related to each type of soil or economic unit, become very plain.

If farm-management specialists, farm organizations, and others now desire to prepare specific plans as to cropping practice, cooperative marketing, and the like, the fundamental relations between soil, climate, transportation, productive units, not to mention other factors, can be determined with a decent measure of precision; in other words, the agricultural economist will now have competent data on which to work.

Soil Inventory

Following the field men who map base and cover, come the soil surveyors who are seasoned men from the College of Agriculture and the United States Bureau of Soils. Since they use the base maps already prepared, they need not continually orient themselves to the section lines and may just as well take their bearings from the corner of a woodlot, or a building. This method permits the soil surveyors to cover ground nearly twice as fast as when they must map base data, and permits 5 soil men to keep up with 10 base-and-cover mappers.

Economic and glacial geologists, meanwhile, have been refining all existing data in their fields, and the hydro-engineer has been running his levels and

[3] See *Roosevelt Wild-life Experiment Station Bulletin* (Syracuse University, Syracuse, N. Y.), March, 1924, Kendall, W. C. "The Status of Fish Culture in Our Inland Public Waters."

investigating storage and power sites. Peat and marl deposits are sounded and sampled. Prehistoric earthworks and the like are accurately located and reported to the authorities in archæology. (Aside from their scientific interest, these may prove attractive to summer visitors. The important sites should be protected and probably be included in the state's park system.)

Economic Inventory

More or less independently of the other field work, the staff land economist has been compiling courthouse and similar records.

Having prepared a plat showing separately each parcel of rural real estate and its assessed value, a county map is made to chart assessed values of all lands, by classes, under $5 an acre, $5-10, $15-25, $25-50, and so on. This map shows definite relations between the various types of soil, topography, and cover. It represents the current judgments of the local people as to the relative and actual values of their lands, and sums up the experience resulting from all prior attempts at land utilization. Discrepancies between the soil and assessed-value maps become conspicuous but, as a rule, they are easily accounted for and justified. If not justified, they are so conspicuous as to attract attention and insure the necessary readjustments.

By interviewing township supervisors (in Michigan also the rural assessors) the land economist also learns and records the character of each land holder, such as bona fide farmer, new settler, squatter, "resorter," absentee speculator, lumber firm, mortgagee. When platted against assessed values and the soil and cover maps, the relations between land types and ownership become evident. When platted to show the percentages of the local tax burden carried by the several types of land and owners, the essential facts as to the incidence of taxation and its significance are easily read.

The history and status of colonization and similar land-selling projects is especially inquired into.

Exports and imports of staples are determined at each important shipping station and, when platted, they graphically portray the economic history of the district, showing, for instance, what volume and value of farm products are going into commerce in ratio to the area under cultivation, and how these data compare with equivalent figures when forest utilization (and devastation) was in full swing.

Census data bearing on population changes in each political unit for several decades, improved acreage, and other factors are digested and graphed in order to relate them to the other economic data.

Finally the ratio between the tax funds remitted by the county to the state treasury, and the state funds returned to the county for schools and roads, is determined.

Suppose these data show that in a county which is certainly "better" than the average of the cut-over districts, during the past 20 years, a quarter-million dollars more, in state tax-money, has gone into the county than has come out. Is this county in the status of a minor child and, pending the time it may mature and become self-supporting, entitled to continued and generous assistance and support? Or, considering the long period since the county was constituted, and the variety of the "development" projects under which its lands have been exploited, is this county, perhaps through no fault of its own, an

economic cripple or bankrupt, and so entitled to charity?

Pioneer or pauper?

Usefulness of Inventory in Land Planning

The answer, of course, depends upon the rate at which resources now undeveloped may profitably be developed in that county. With few exceptions, these must involve farm, forest, or recreational utilizations. The history, current status and immediate future of each has been mapped, charted, or graphed, in detail, and this has been done without involving controversial material. Each separate determination or indication is supplemented and cross-tied to others of different origin. An inventory has been made; it covers physical and economic factors.

If there is a successful agriculture established upon certain types of soil, and if the record shows the acreage in tillage to have been expanding consistently, and if raw land of similar soil and configuration yet remains undeveloped, it is quite certain that such land will gradually come into agricultural production. The rate at which it may reasonably be expected to come in to such use is also established. If this rate is so slow as to threaten the confiscation of raw-land values through compounding carrying charges, both owners and public are made aware of that situation and may proceed accordingly.

If there is a successful agriculture established upon certain types of land, but if there is no considerable acreage of similar land not already included in farm units, and if the balance of the land in the county, having been tried repeatedly without avail, remains unproductive and unused, meanwhile accumulating carrying charges, then it will appear quite evident that if the idle land is to become productive before it is confiscated by taxes, or afterwards, then forests must be protected, maintained, increased, and worked, and the measures necessary to accomplish this will be known.

If the demand for recreational resources, including big, safe, green forest areas full of game, and streams full of fish, is now equal to or in excess of the supply, and if it is considered desirable to maintain and even to increase the supply of such recreational resources, then the areas available for such developments and utilizations will be known and the means to those ends can be devised.

If the existing status of land affairs, when faced, is unsatisfactory or intolerable, and if it appears certain that there must be material changes in policy and procedure before conditions can be bettered, then the nature and scope of those changes is made plain.

If the necessary changes involve burdens too complex or too heavy for local land owners and communities, and if county, state, and nation must distribute the burdens—as, for example, through the control of settlement operations, increased forest-fire protection, timberland tax reform, regulation of lumbering to prevent forest devastation and insure prompt and high-quality second growth after cutting, public acquisition of forest lands, wild-life refuges, or parks—then the equitable distribution of the burdens and benefits may be considered and scheduled upon the basis of competent base data.

The intelligent utilization of land is essential to our safety and prosperity.

Intelligent use of land is predicated upon a competent classification and inventory of land.

The Michigan Land-Economic Sur-

vey seems to have provided the essential mechanism of land inventory.

It remains to be seen whether there is yet sharp enough focus of understanding and political potency to insure that the land inventory will be used, and so used as to proceed diligently and directly in the working out and application of the policies and procedure necessary in order to reduce unwise use and encourage wise use of land.

Perhaps, for some years yet, we must continue to dawdle, pretend, and evade the critical issues. But the pressure of tens of millions of acres of bankrupting land, the perennial difficulties of agriculture, and the penalties inflicted by the steady depletion of essential forest products, to say nothing of other factors, will be hard to resist.

Presently, no doubt, the inventory of lands will become an every-day affair, and dependence upon such inventories will be as inevitable as is already the case wherever economists and engineers may function freely.

THE MEANING OF PUBLIC UTILITY—A SOCIOLOGICAL INTERPRETATION

By MARTIN G. GLAESER

THE use of the term "public utility economics," as illustrated in the title of this quarterly, suggests that there is a sector in the industrial field which is readily distinguishable, the economics of which may be separately treated. To ascertain the limits of this field and to seek to determine, with as much precision as possible, its distinguishing characteristics, is the purpose of this article.

The term "public utility" is one of recent coinage. In fact, the dictionaries, encyclopedias of law, and other works of reference have no discussion of the subject-matter under this heading. Years of observation of the unconscious use of the term by people generally has led me to conclude that it is being used as a generic term to cover only the local utilities such as gas, water, telephone, electric, and street-railway utilities. Recent works relating to this general subject-matter have used the term in this restricted sense.[1] However, when attention is called to the logical possibility of comprising within the term railways, the telegraph, express companies, and so forth, no objection can usually be urged against such an enlargement of its meaning. We find, then, that the scope of the term, public utility, is both broad and narrow with a great variety of interpretations between the two limits. If we would orient public utility economics, it becomes necessary to determine what meaning of the term is correct, and what standards shall be used in reaching our conclusion.

[1] Maltbie, W. H., *The Theory and Practice of Public Utility Valuation* (1924); Cooke, M. L., *Public Utility Regulation* (1924); Morgan, C. S., *Regulation and the Management of Public Utilities* (1923); Lyndon, L., *Rate-making for Public Utilities* (1923).

I

If you were to ask the man on the street, "What is a public utility?", he would very likely reply: "Why, gas companies, the street-car system, the electric light and power company." His answer is concrete and he thinks in terms of his environment. If the same question were put to a government official concerned with the regulation of these companies, he would probably reply: "A public utility is what the statute book says it is." The official's answer is one step removed from the concrete and he makes his definition one of authoritative interpretation. Then, if you were to reply that statutes presuming to regulate the prices charged by particular types of enterprises have been declared unconstitutional by the courts, he might shift his ground and give the abstract answer: "A public utility is a business affected with a public interest." He may hasten to relieve your very evident perplexity upon receiving this enigmatical reply by citing opinions of the courts where the question is answered and send you on your way rejoicing. But your joy will be short-lived, for the mystery deepens as you immerse yourself in the pages of the case reports. Nevertheless, these replies are indicative of the procedure by means of which the legal conception of a public utility becomes concrete.

The Munn Case

Judicial consideration of the question usually begins with the famous decision in *Munn* v. *Illinois* [2] in 1876 which has, by common consent, been placed at the threshold of our modern treatment of the public utility problem. *Munn* v. *Illinois* involved the validity of an Illinois statute fixing maximum rates for storing grain in elevators at Chicago. Munn and his partner Scott had been engaged in the elevator business since 1862, long before the enactment of the statute. They had been in the habit of charging rates fixed by agreement among the elevator owners in Chicago and had continued to charge these rates although they were in excess of those fixed by the act. They were convicted and fined in the state courts and appealed to the United States Supreme Court upon the ground that the act was in violation of the Fourteenth Amendment in that it deprived them of their property without due process of law.

Chief Justice Waite, in upholding the validity of the statute, said in substance that under the circumstances in which the elevators were being operated in Chicago, that is, standing "in the very gateway of commerce and taking toll from all who pass," they had become a business "affected with a public interest" and "had ceased to be *juris privati* only." The mystic formula was not his own language but quoted from Lord Chief Justice Hale who had penned it 200 years before in England. This legal doctrine, he said, had been a rule of the law of property ever since; that under this rule and in the exercise of the police powers of the state "it had been customary in England from time immemorial and in this country from its first colonization to regulate ferries, common carriers, hackmen, bakers, millers, wharfingers, innkeepers, and so forth," and to fix maximum charges.

Justice Field, in his dissenting opinion, objected that the rule applied only in those cases where the business was based upon a governmental franchise or license, or claimed by prescription through long usage and consent. The warehouses here in question had always been a private business and had not been operated under governmental franchise nor had they received governmental privileges. He ridiculed the idea of constituting them public warehouses. "There is no magic," he said, "in the language, though used by a constitutional convention, which can change a private business into a public one. . . . A tailor's or a shoemaker's shop would still retain its private character, even though the assembled wisdom of the state should declare, by organic act or legislative ordinance, that such a place was a public workshop, and that the workmen were public tailors or public shoemakers."

Justice Field was undoubtedly right if the expression is to be given the narrow interpretation for which he contends. But, as Professor Commons has so clearly pointed out,[3] the right of government to regulate prices is made by the majority opinion to depend not alone upon "a special grant of sovereignty," but also upon a recognition of the fact that private property rights bear within themselves the germ of coercion which becomes apparent when *economic conditions* create a state of facts which the majority has recognized as virtual monopoly.

But we have not yet learned the meaning of the phrase "affected with a

[2] 94 U. S. 113 (1876).

[3] Commons, John R., *Legal Foundations of Capitalism*. The Macmillan Company, New York, 1924, p. 33.

public interest." It means in the none too clear language of Chief Justice Waite that private property is being used "in a manner to make it of public consequence, and affect the community at large. When, therefore, one devotes his property to a *use* in which the public has an interest, he, in effect, grants to the public an interest in that use, and must submit to be controlled by the public for the common good, to the extent of the interest he has thus created. He may withdraw his grant by discontinuing the use; but, so long as he maintains the use, he must submit to the control." What then are the *uses* of property in which the public has an interest?

The Wolff Packing Company Case

The last judicial exposition of the doctrine is contained in an opinion by Chief Justice Taft in *Charles Wolff Packing Company* v. *Court of Industrial Relations of the State of Kansas.*[4] The Court of Industrial Relations Act of 1920 had declared the following to be affected with a public interest: the manufacture and preparation of food for human consumption; the manufacture of clothing; the production of any substance in common use for fuel; the transport of the foregoing; common carriers and other public utilities. It is certain that this represents the extreme limit to which the application of the doctrine has ever been pushed. Under the act the Industrial Court was empowered to fix wages and other terms of employment in the event of labor controversies imperilling the peace and health of the public. The act was challenged on the ground of conflict with the provisions of the Fourteenth Amendment.

Chief Justice Taft, in considering the question, classifies business affected with a public interest and thus justifying some public regulation, into three classes: (1) Railways, other common carriers, and what he terms public utilities. These he characterizes as businesses carried on under authority of a public grant either expressly or impliedly imposing the affirmative duty of rendering a public service demanded by any member of the public. (2) Certain exceptional occupations, so recognized and surviving from the earliest times when arbitrary laws by Parliament or Colonial legislation regulated *all* trades and callings. Examples are innkeepers, cabs, and grist mills. (3) "Businesses which, though not public at their inception, may be fairly said to have risen to be such and have become subject in consequence to some government regulation. They have come to hold such a peculiar relation to the public that this is superimposed upon them. In the language of the cases, the owner, by devoting his business to the public use, in effect grants the public an interest in that use and subjects himself to public regulation to the extent of that interest * * *" No illustrations of businesses falling within this class are cited, but the grain elevators of the Munn case are implied.

It is apparent that this classification is an inductive generalization from legal history. It accepts without question, as one class, industries based upon the franchise, in regard to which both the majority and minority in the Munn case were in agreement. It distinguishes as a second class callings that fall with difficulty into the classification. Even the minority accepted these as survivals of the restrictive economy of feudalism and mercantilism. The third classification represents the element of growth as

[4] 262 U. S. 522 (1923).

evidenced in the Munn case,[5] the Budd case,[6] the Insurance case,[7] the Pipe Line cases,[8] and the Rent cases.[9] By way of warning that the conception of public interest be not taken too literally the Justice adds: "In a sense, the public is concerned about all lawful business because it contributes to the prosperity and well-being of the people. The public may suffer from high prices or strikes in many trades, but the expression 'clothed with a public interest,' as applied to a business, means more than that the public welfare is affected by continuity or by the price at which a commodity is sold or a service rendered. The circumstances which clothe a particular kind of business with a public interest, in the sense of *Munn* v. *Illinois* and other cases, must be such as to create a peculiarly close relation between the public and those engaged in it, and raise implications of an affirmative obligation on their part to be reasonable in dealing with the public." He might have added, as legal writers frequently do when dealing with problems of this character, that the distinction is one of *degree* which is raised to one of *kind*.

But beyond the classification of the businesses regarded as affected with a public interest the court leaves us in the dark in the Wolff Packing Company case as to its conception. It merely suggests that, in the case of industries in the dynamic group, "the thing which gave the public interest was the indispensable nature of the service and the exorbitant charges and arbitrary control to which the public might be subjected without regulation." Indeed, Chief Justice Taft senses the delicacy of the problem when he says: "It is very difficult under the cases to lay down a working rule by which readily to determine when a business has become 'clothed with a public interest.' All business is subject to some kind of public regulation; but when the public becomes so *peculiarly dependent* upon a particular business that one engaging therein subjects himself to a more intimate public regulation is only to be determined by the process of exclusion and inclusion and the gradual establishment of a line of distinction."

In one other respect this opinion does throw some light upon the problem. The constitutionality of the Kansas Act had been urged upon the analogy of the doctrine of public use as exemplified in condemnation cases and tax suits. But the court did not regard these as "especially helpful." That doctrine was conceived to have a wider application inasmuch as public use may "cover almost any private business if the legislature thinks the state's engagement in it will help the general public and is willing to pay the cost of the plant and incur the expense of operation." The court probably had in mind the North Dakota legislation involved in *Green* v. *Frazier*,[10] under which the state had engaged in competitive business.

II

If the search for a definite answer in the cases is thus puzzling or inconclusive, must we abandon the attempt and take refuge in the faith that the court knows what it is about even if it does not tell us so very clearly? That evidently is what many writers of the texts have done. They will be found repeating the standard phrases until the habitual reader of these materials "knows them by heart." But we began this in-

[5] 94 U. S. 113 (1876).
[6] 117 N. Y. 1 (1889).
[7] 233 U. S. 389 (1914).
[8] 234 U. S. 548 (1914).
[9] 256 U. S. 135 (1921).
[10] 253 U. S. 233 (1920).

quiry with the view of determining the limits of a field of economic enterprise which is generally supposed to represent an organic unity.

De Quincey once wrote: "It is a natural resource that whatsoever we find it difficult to investigate as a result, we endeavor to follow as a growth. Failing analytically to probe its nature, historically we seek relief for our perplexities by tracing its origin. Thus, for instance, when any feudal institution eludes our deciphering faculty from the imperfect records of its use and operation, then we endeavor conjecturally to amend our knowledge by watching the circumstances in which that institution arose."

Does this not apply with special force to our problem here? It is certain that the legal conception of a "public utility" is a matter of long growth. The Middle Ages, out of which the American development proceeded, termed the then correlative a "public employment" as distinguished from a private employment. This was a distinction recognized by the common law. If we follow the development of these industries, or such of them as show a continuity in development, into Ancient Times, we find that most of them were governmental functions.

No one has done more to explain in detail the nature of the law governing public employments than has Professor Bruce Wyman. But it was the genius of Dean Roscoe Pound that first saw the central principle running through this long historical development and which was preserved by the peculiar character of the common law. In his illuminating lectures on the "Spirit of the Common Law," he distinguishes its two characteristics. One is its extreme individualism; the other is its treatment of individuals as members of a group.

It is the second characteristic which is of importance to us here. Quoting Dean Pound's own words: "On the other hand, it is characterized by another element tending in quite another direction: a tendency to affix duties and liabilities independently of the will of those bound, *to look to relations rather than to legal transactions* as the basis of legal consequences, and to impose both liabilities and disabilities upon those standing in certain relations as members of a class rather than upon individuals."

His explanation of this characteristic is that it represents the feudal element in our law and is in its origin due to the fact that when the common law was in process of formation, the principal social and legal institution of the time was the feudal relation of lord to man. "Here the question was not what a man had undertaken or what he had done but what he was. The lord had rights against the tenant and the tenant had rights against the lord. The tenant owed duties of service and homage or fealty to the lord and the lord owed duties of defense and warranty to the tenant. And these rights existed and these duties were owing simply because the one was lord and the other was tenant. *The rights and duties belonged to that relation.* Whenever the existence of that relation put one in the class of lord or the class of tenant, the rights and duties existed as a legal consequence. The first solvent of individualism in our law and the chief factor in fashioning its system and many of its characteristic doctrines was the analogy of this feudal relation; suggesting the juristic conception of rights, duties, and liabilities arising, not from express undertaking, the terms of any transaction, voluntary wrong-doing or culpable action, but simply and solely as incidents of a relation."

Public Utility Origins in Medieval Economy

It is not wrong to speak of the medieval ideal as that of an ordered society where each has his place, for this appears to have been in large part true. Life was cast in a régime of custom and status and economic wants were viewed from this narrow outlook. Ordinary buying and selling in incorporated towns was controlled by the gilds. Exceptions were found in the market towns and at fairs. A similar system of control and exclusive jurisdiction obtained in the villages where the feudal lord was the center of the manorial economy. His control was exercised in person or through bailiffs sitting as judges in the manor courts. Prices and character of services were thus controlled. From this point of view, peculiar to the political economy of feudalism, medieval courts viewed those economic dealings of which our modern public utility dealings are the lineal descendants.

It must not, however, be lightly assumed that the distinction between a public and private calling, drawn in modern times upon some theory of monopolistic as against competitive undertakings, was the basis of the medieval distinction. As E. A. Adler has shown,[11] to import this meaning into the medieval term of common carrier, common innkeeper, common tailor, common surgeon, common blacksmith, common barber, and common miller would be to read into simpler economic conditions the complexities of modern economics. The term "common" when used by the medieval lawyer was used to indicate rather that the employment was public in the sense of available to all who might want to be served. In the self-sufficing economies of that distant time there were many craftsmen who were employed entirely on private account. Such employment required them to be distinguished from the plying of a craft for common use and for account of the craftsmen. Viewed in this light, gild regulations and judicial regulations are illustrative merely of the all-pervading spirit of authoritative control of industry and life.

The peculiar nature of gild organization, which assembled all the members of the same trade or craft into separate associations, and granted them a local monopoly of plying their trades or crafts, and the restricted, self-sufficing character of the manorial economy, was effective in giving to these public or common callings a character that required close regulation.

The next step in the process is not clear. Why certain occupations or callings, conceived to be carried on under peculiar conditions, were subjected to special regulation, is worthy of intensive historical study. Wyman asserts that it was due to the undeveloped state of the law of contract. He also refers to the existence of virtual monopoly in such callings as that of the common carrier and innkeeper. It is certain that justices in the royal courts decided cases involving these callings upon a theory that the individual customer was in a position of dependence and required protection. In the cases of the ferrier and wharfinger, presumably occupations requiring a license, we have the authority of Lord Hale: "If the king or subject have a public wharf unto which all persons that come to that port must come as for the purpose to unlade or lade their goods, *because they are the wharfs only licensed by the queen,* according to the statute of 1 Eliz. cap. 11 or *because there is no other wharf in that port,* as

[11] "Business Jurisprudence," *28 Harvard Law Review, 135,* December, 1914.

it may fall out where a port is newly erected, in that case there cannot be taken arbitrary and excessive duties or cranage, wharfage, pesage, and so forth, neither can they be enhanced to an immoderate rate, but the duties must be reasonable and moderate though settled by the king's license or charter. For now the wharf and crane and other convenience are affected with a public interest and they cease to be *juris privati* only. As if a man set out a street in new building on his land, it is no longer bare private interest, but it is affected with a public interest." In addition, an affirmative duty was placed upon them to serve all fairly and special liability for negligence was created.

The Laissez-faire Period

The re-awakening in the seventeenth and eighteenth centuries of ideals of *laissez-faire* brought forward the open market as the predominant exchange mechanism, where the gild and manorial system had relied upon the controlled market. Competition and individualism as social forces were gaining ever wider applications. Legal monopolies were being restricted. The callings once closely controlled by gild regulations were freed.

The tendency for competition to displace the voice of public authority in the control of industry was stopped, however, when the turn came to apply the prevalent notion of unrestrained competition to these selected callings. The *laissez-faire* period served as a test of the restrictive system. Thus, in the case of public callings, the essential elements in the medieval framework of regulation survived its general collapse. They continued to be "businesses affected with a public interest." Their duty to provide adequate service and facilities was not abated. Even more than under conditions of a restricted market was it incumbent upon them to render service to all applicants without discrimination. The law continued to require that the prices charged be reasonable.

Peculiarities in the United States

In the United States another factor contributed to emphasize competition and hold governmental restrictions in abeyance. In addition to a desire to free industries from colonial restrictions, there was the desire to give individual initiative free scope. In the conquest of a continent, facilities of transport and communication were agencies of the first order. The desire, therefore, to get these facilities early gave competition greater scope. Early charters testify to public liberality. Courts were seldom called upon to adjudicate complaints. It was not until after the Civil War when complaints concerning discrimination and high rates arose in those territories where railways had been introduced that a demand came for closer regulation. Pioneer communities still requiring these facilities did not take part in the agitation and continued to be friendly.

The courts, however, by going back to the historical elements of our jurisprudence before the Revolution, adopted the conception of a public calling worked out in the mother country. When the epoch-making case of *Munn* v. *Illinois* was decided, the court referred to this historical element, as we have seen, and took it as a maxim of the law that since to serve all at a fair price was immemorial practice, the legislative regulation of price was due process of law.

We conclude, therefore, that the sig-

nificance of the phrase "business affected with a public interest" resides not so much in the character of the industry thus classified, as in the complex of rights and duties that go with such classification. This implies that its importance is that of an institutional development. The core of it is represented by *the feudal conception of relation* which has been hardened into a social habit by becoming commonly accepted. The conception thus generalized has been given greater solidity and rational, coherent form by being organized into a definite mode of social procedure designed to regulate certain forms of social intercourse. There was a persistent need for developing these forms of procedure and as a consequence these forms have crystallized into an institution which controls the continued performance of the function.

III

The deepest fact upon which an understanding of our modern economic society must be based is this: that the forces of individualism and technical progress have built up an economic system in which wealth is produced by many productive agencies working independently and scattered over a wide territory. Economists call this principle of organization the "division of labor," and its derivative the "localization of industry." It is through the division of labor primarily, and all that it implies, that man is best able to proportion economic means to economic ends, to correlate efforts and results so that the latter shall be a maximum. All institutions, therefore, which aid in giving effect to the division of labor are economic institutions par excellence.

But a necessary counterpart of the division of labor is the cooperation of those among whom the labor is divided to the end that their separate contributions in the production of wealth may be combined in a flow of goods and services ready for consumption. Such cooperation may come about voluntarily or under compulsion. Accordingly, mankind has developed a series of institutions that together afford a mechanism for the voluntary or compulsory exchange and circulation of economic goods. The pivotal importance of mediums of exchange and of markets and market prices is familiar to every close observer of modern business. Individuals are left free to choose their own course of action, but the means for effective cooperation are provided in our jural institutions whose binding power is maintained and developed, for example, in our law of property, contract, agency, corporations. The political institution of the state cooperates by providing the social apparatus through which compulsion and persuasion act and register their results. When the motivation of such action is purely voluntary, we call it private business. When the work proceeds under the compulsion of the state, we call it a public function. But where in this picture, we may ask, does public utility business fit in?

Nature of Public Utility Enterprises

It must be clear that public utility enterprise exhibits a strange mixture of volition and compulsion. Compulsion was characteristic of feudal times, while persuasion was the touch-stone of *laissez-faire*. The legal rights and duties to be observed by individuals toward each other in feudal times flowed as a result of the *relations* that individuals bore to each other, whereas in the freer atmosphere of *laissez-faire* the rights

and duties were a result of express undertakings or *contracts*. The public utility institutions, originating in feudal times and as modified by *laissez-faire* doctrines, combine the compulsory affixing of rights and duties as a consequence of "relation" with the *voluntary* procedure of entering upon contractual obligations. Persons are free to enter upon a public service enterprise, but having entered upon an undertaking of this character they are constrained by its peculiar system of rights and duties. Persons are free to consume the products or use the services of a public utility or not as they choose, but having voluntarily agreed to take such service, they are bound by its peculiar system of rights and duties. Thus, volition and compulsion are combined in the elaboration of a scheme which collectively constitutes the law of public service companies.

There are many types of undertakings the relationships with which, either as producer or consumer, bring legal consequences as described above. The nature of the institution itself—the complex of legal rights and duties—is singularly fixed and unvarying. It is an institution not solely of economic significance but also one of large political importance; for while, on the one hand, it is concerned with the material needs of individual economic life, it serves, on the other hand, to strengthen and make possible socio-economic life. Out of its institutional character arises the public interest in its maintenance and development.

From this point of view the term, public utility, does not refer specifically to an industry, but it becomes the collective name for a whole group of industries. It is a highly abstract conception of certain relationships embracing certain definable rights and duties. What the medieval jurist, as well as the modern jurist, means when he says that certain employments are public employments is this: that the objects of property engaged therein are "affected with a public interest" and that he wants these employments to be cast within the mold of relationships which will insure their successful prosecution. If one would understand the nature of the institution, one must understand the rights and duties which compose it. If one would understand the rights and duties, one must understand the public interests which those rights and duties are to conserve. If one would understand why the conservation of these public interests should become a matter of rights and duties, molded and enforced by the state, one must understand the process of social evolution. The state lends to the institution the coercive power of its sovereignty. It is not without significance that some modern French writers have discussed even the state itself in terms of a great public service corporation.

Rights and Duties of Public Utilities

What is the precise nature of this peculiar system of rights and duties? A public utility is under the extraordinary duty to render service to all who apply. Persons engaged in private business are at liberty to refuse to serve any or all. Moreover, to those in private business, their own private interest and the ability of customers to seek out others is assumed to be self-corrective for any failure to provide adequate service. Again, a public utility is required to serve up to the limit of its capacity, where capacity is more and more being defined, not as mere physical capacity, but as the limit of profitableness. It may not let customers' wants go unsat-

isfied. Nor may it attach unreasonable conditions to contracts for service so as in effect to negative its duty "to serve all comers." Furthermore, it must serve without discrimination all customers similarly circumstanced. Finally, a public utility must observe more than ordinary care in the rendition of service in view of the generally hazardous nature of the circumstances surrounding the service and the dependence of the public upon such care.

On the other hand, the law concedes the public utility the right to withdraw service under certain conditions, but after giving notice to customers. Customers are given the reciprocal right to demand that a public utility live up to its duties and are, on the other hand, required to accept reciprocal obligations. Such in general terms are the rules of law outlining the rights and duties of public utilities toward their patrons.

Economic Characteristics of Public Utilities

In determining whether an industry is subject to this coercive law, or, in other words, whether it is a public utility, the courts have adopted certain practical tests to aid in making the distinction between a public and a private utility. These tests are generally of an economic character.

The problem arose first in connection with turnpikes. The law here had no difficulty, since the turnpike was simply a highway and that had always been a public utility. In the absence of the franchise grant to private persons to construct the highway and charge tolls, the highway would have been a public facility and free to all users. When bridges began to replace ferries, the charters of bridge companies similarly authorized tolls, the provisions in some cases being that when the tolls had been sufficient to repay, in addition to operating expenses, the entire first cost of the bridge and a designated annual profit, the bridge should become free. Bridge companies were treated as successors to the ferryman. With the coming of the canal and the steam railway, the same legal principles were brought into play, until it seemed that the common carrier relation would exhaust all types of services to which this special system of rights and duties might be applied.

The first break in the development came with the telegraph and the gas light company. At first telegraph companies were treated as carriers. Soon it was perceived, however, that the analogy was misleading. It then appeared that the legal category of public utility might cover many and diverse industries, and hence the various tests of what constitutes a public utility began to appear in the decisions.

The clearest test is the one which bases the classification upon *natural limitations as to a source of supply*. A water company which utilizes the most advantageously situated watershed in gathering its water supply is held by that fact to constitute itself a public utility. Under the same head would fall an irrigation company which impounds the only available stream and the water-power company which utilizes the only available site for a dam. Gas companies drawing their gas supply from natural gas fields are similarly situated.

A second test relates to *the character of the product*. If the character of the product is such that its local distribution facilitates control of the market, we have to do with a public utility product. Thus artificial gas plants and elec-

tric plants sell a service which must be taken by customers directly connected with the plants. In view of the difficulties of granting occupation of the streets to competing concerns, the customer is, in effect, dependent upon a single source of supply.

A third test looks to *the scarcity of advantageous sites,* such as sites for union stations and terminal companies, and dock sites for elevators and wharves.

A fourth test emphasizes *limitations of time* as a factor in the situation. Thus innkeepers, cab companies, telephone and telegraph services are held to come within a situation in which their customers, being under the need for urgent service, are placed in a position of dependence.

Another recent test has been based upon the broad ground that where a product or service is supplied under conditions which deter effectual competition from entering the market, the industry should be subjected to the coercion of public utility law. In elaborating these conditions the courts have pointed to the large initial cost of the plant, and to the tendency of costs to decline with increase in business as deterrents to potential competition.

Significance of Economic Tests

It should be clear that these tests represent a recognition on the part of the judiciary that the conception of the general welfare which underlies the theory of *laissez-faire* had to be revised. Fair prices, in the sense of competitive prices, were not being realized in practice because a willing buyer was not negotiating with a willing seller. Elements of compulsion were mingled with persuasion. In order to dissolve the element in the situation whereby one individual coerces another, the police power of the state had to be invoked.

The following conditions, therefore, must be realized in order to constitute a given industry a public utility.

1. The economic need which the given industry satisfies must be of a nature that is generally recognized as a common necessity for civilized life. Public opinion is the final arbiter in the selection of such economic needs. The doctrines of "public use" and of "public interest" are a recognition of the common interest which underlies them both. In a society which is accustomed to look to governmental initiative for the supply of common needs, the facility will be supplied as a public function. On the other hand, a society which is distrustful of the state as an agency for supplying such common needs, and a society in which the forms of associated private activity like corporations have been developed will leave the supplying of such common needs to a private agency under a franchise privilege, not as a matter of common right, but as an agency of the state.

2. All economic activity, in so far as it transcends the immediate economy of the individual and thus becomes a case of production for an open market, has a certain social interest which must not be confused with public interest. All such production of utilities for sale remains a matter of common right, and public interest is satisfied if freedom of choice is maintained. But when, in the course of economic evolution, freedom of choice becomes seriously restricted—that is, when the coercion residing in private property makes itself felt as a monopolistic power—public interest arises in proportion as equality of opportunity to choose is restricted. Private property means exclusive control, but it is defensible only when it results

in equality of opportunity to enjoy the benefits of private property. If the human need supplied is one not recognized as a necessity, restriction of choice will not call forth governmental interference.[12]

If, therefore, the idea of common necessity is at the basis of our idea of public utility, the determination when such a need becomes public must be a matter of collective judgment. Lighting of homes has been such a common need, but did not attain aspects of a public utility until technical progress had developed gas as an illuminant and established it as definitely superior. Freedom of choice between gas and candles existed, but it was a choice between alternatives of which one was generally adjudged inferior. When electric lighting was introduced, the lighting of homes with electricity did not attain aspects of public utility until common consent established its definite superiority. Gas was no longer an *effective* substitute. Collective judgment, therefore, declared electricity a public utility. Thus the concept of public utility becomes an instrumentality in the *improvement of the standard of life.*

Finally we may say that the recognition of the public utility relationship represents the assertion of a preponderance of public interests over private interests. Since the law recognized certain relatively unchangeable rights and duties, the legal conception of a public utility in the course of time has attained a certain fixity in form and outline. On the other hand, there is nothing fixed about the number and kind of industries that are presumed to be subject to its rules. To borrow an expression from legal literature, it can be said that the conception of a public utility is a fixed concept with a changing content; that is, the industries now recognized as "affected with a public interest" will not *necessarily* be the industries which the law of the future will classify as public utilities. The industrial and political situation of the time, and particularly the state of public opinion, will determine (*a*) the number and kind of industries classified as public utilities, (*b*) the elaboration of the system of rights and duties which make up the institution, (*c*) the regulating agencies employed, (*d*) the instrumentalities of regulation (whether rules of law, positive statutes, charters, or special franchises), and (*e*) the subordinate administrative standards which are applied as a matter of practice. The trend in the development and application of the institution will be a resultant of the weight of social inertia, of the pressure of the economic environment, and of the influence of intellectual progress.

IV

In conclusion one may ask: What is the practical significance of this conception of a public utility? It is the writer's belief that the dynamic view of public utilities illuminates the entire field of regulation and management. When we regard public utility enterprises as going concerns having relations with consumers, investors, stockholders, and employees that differ appreciably from the corresponding relations of private utilities, we realize that the economic and legal principles applied to private concerns cannot and should not be applied to the same degree to public utilities. In other words, the transactions of public utilities with consumers,

[12] This treatment has not emphasized the need for regulation arising out of the power of monopoly to exercise price discrimination among its customers. The concept of discrimination will be reserved for separate treatment in a later article relating to price policies.

investors, stockholders, and even employees are fundamentally of a different order from the same transactions of private utilities. This is clearly recognized when the state establishes a policy of regulation and grants or imposes distinctive rights, duties, or privileges, which place these businesses in a separate sphere of economy.

Practical difficulties arise, however, when in applying this point of view to the details of regulatory policy, courts, administrative officials, and even economists attempt to apply without modification to a regulated economy the principles which may hold true for a competitive economy. When the distinction is made, this point of view will throw a flood of light on the various problems of financing public utilities, their regulation and evaluation. It is of peculiar importance also for an understanding of relations between employers and employees. Without multiplying or detailing illustrations, enough has perhaps been said to show that this dynamic conception of public utilities opens up a realistic approach to the changing problems of this class of enterprises.

INSURANCE AND THE FARM HAZARDS

By V. N. VALGREN

EVERY year the American farmer invests in the activity of crop production amounts of accumulated capital and current labor aggregating eight or nine billions of dollars. This investment is made not in corn, cotton, wheat, oats, barley, or flax in a finished or usable form, but rather in prospects of reaping these essential commodities at harvest time and of obtaining returns upon the investment through the marketing process. The risks involved in this annual expenditure of capital and labor for the production of crops constitute the "farm hazards" that are the special subject of this paper, omitting all those other forms of insurance protection, such as life, accident, health, fire, tornado, and automobile, which the farmer needs more or less in common with the city man.

Because of the large annual investment in mere prospects, the farmer may be said to be a risk taker of a pronounced type. In fact, when farmers on occasion have rightly or wrongly accused other economic groups of being gamblers, these have retorted that farmers themselves are the greatest gamblers in the world. It should be remembered, however, that the risk assumed by farmers is not a gambling risk in any proper sense of the term, since gambling carries with it the idea of unnecessary or self-created risk. The risk carried by the farmer is, however, incidental to, and inseparable from, one of our most important and basic industries—a risk which cannot be eliminated but must be carried by the farmer himself, unless some organization or institution will relieve him of this risk or share it with him. The risks assumed by many other groups of risk takers may, of course, be defended from the charge of gambling on similar ground.

Two Classes of Crop Hazards

The risks and hazards that the crop producer assumes may be grouped under two heads: (1) the risk of an oversupply of his product as measured by market demand, at a price that will pay cost of production, including a fair reward to the producer; (2) the risk that his own crop will meet with disaster, even though such crops in general are good, and the prices satisfactory.

The first of these risks or hazards acts upon whole groups of farmers or planters. The second acts mainly upon individuals or smaller sub-groups, but is, as a rule, even more disastrous to those upon whom it falls than is overproduction with low price.

The danger of a supply in excess of market demand again represents a risk or a hazard which exists for other groups or classes of producers as well as for the farmer. Most of the producing groups outside of agriculture are in a better position, however, to adjust their output. The producing units in manufacturing and industry are relatively large and comparatively few in number, and the adjustment of their output is, therefore, less difficult. In agriculture, on the other hand, the number of farms or producing units with reference to a given commodity is relatively large, varying from a number of

thousands to a number of millions for the different commodities produced. Concerted action in the adjustment of the supply of an agricultural product to the market demand is, therefore, very difficult. Even when the acreage of a given crop is adjusted on a basis of probable demand for the product, there still remains the uncertainty of the average yield per acre and hence of total supply for a given season.

The burden of adjusting production to the probable demand, in so far as this can be foreseen at present, must always be carried by the farmers themselves with such aid or advice as they can get from state and federal departments of agriculture, agricultural colleges, or special organizations of their own, which keep abreast of agricultural development and observe agricultural trends. Insurance organizations can be of little help in taking from the shoulders of the farmer the risk of overproduction and a resulting inadequate price. Any attempt to do this is quite certain to lead to failure and, if undertaken on any large scale, would be likely to ruin the insurance organizations and sooner or later leave those whom it was intended to help worse off than they were before.

Wherever lies the power to determine the distribution of the cultivated acreage to different crops, there also must lie the responsibility for overproduction of a given commodity with resulting gluts in the market and inadequate price. This is by no means an agreeable or pleasant doctrine from the point of view of the individual agricultural producer, but it is believed to be a stubborn fact which had better be faced than disregarded or dodged.

Against the second class of risks or hazards assumed by the farmer—namely, those involving failure or destruction of the crop on a given farm, or in a local area—insurance companies can and should, in the writer's opinion, afford a measure of protection. Indeed, there seems to be no valid reason why the farmer should not be in position to insure against the weather and other natural hazards to his growing crops just as men in nearly all other lines of business insure against hazards to their property or interests.

The first insurance written, so far as history reveals, was insurance against the hazards of "trading at sea" and was, therefore, essentially insurance against the weather. Yet the farmer hitherto has had little opportunity to obtain insurance protection against the hazards to his growing crops, either from the weather, or from other causes that may bring destruction to these crops in spite of every effort on his part. Only against loss by hail has insurance been generally available. In recent years, however, insurance companies have appeared to be awakening to the fact that the farmer is entitled to insurance, not only against destructive hail storms, but against other hazards beyond his control, and some of these companies at least are attempting to devise forms of insurance coverage that will meet his needs.

Crop Damage and Financial Loss

Before attempting a discussion of problems and principles involved in real crop insurance for the farmer, it seems necessary to arrive at an understanding of what is meant by the terms "loss" or "damage" when used in connection with growing crops. It is apparent that many speak of loss to farmers from this or that cause when they actually mean a reduction in promised yield, or in other words, loss of prospects of a given yield. Such reduction or loss does not

in all cases, however, mean financial loss on the year's operations.

Assume, for instance, that a farmer invests in his wheat crop an amount of capital and labor, which at a current price of wheat is equivalent to 16 bushels per acre. The crop develops and he has in prospect, let us say, 24 bushels to the acre. Then occurs one of those untoward weather conditions or other hazard such as drought, hail, frost, excessive moisture, excessive heat, insect pest, or plant disease, and reduces his crop prospects by 25%. The farmer harvests 18 bushels of wheat to the acre on a field where he invested the equivalent of 16 bushels to the acre. He, therefore, enjoys a profit instead of suffering a loss, in spite of the crop damage that occurred. If the same farmer, on the other hand, suffers crop damage which brings his total yield down to 8 bushels per acre or less, he will find that he has not only worked for nothing, but has lost a part of the capital with which he started out in the spring. In the latter case he has suffered not only crop damage but has incurred a financial loss on his season's operations equal to the difference between his investment in the form of labor and capital and his meager returns, if there are returns in any amount.

The amount of crop damage suffered annually by farmers mounts to enormous figures. In order to arrive at some estimate of such damage for various important crops, the United States Department of Agriculture has for a number of years required of its thousands of crop reporters an estimate of the percentage of damage in their respective localities. For the purpose of making these estimates the Department arbitrarily assumes that a crop exceeding the normal yield by 10% is a perfect or no-damage crop for the territory in question. The normal yield may in turn be defined as the yield that the crop reporter has in mind as one that in good years actually occurs over extended areas and in percentages of which he reports crop prospects as well as crop damages from the different causes. The raising of the normal yield by 10% in order to determine the no-damage yield is an attempt to make suitable allowance for the fact that the yield which the crop reporter, as the result of experience or observation, has in mind as a normal yield for his locality, is not strictly a perfect no-damage yield. The difference between a perfect or no-damage yield and the actual yield is the measure of crop damage.

Using the word "crop damage" as just defined and first taking wheat as an example, it was found that on a percentage basis covering the United States as a whole the average annual crop damage from the various causes during the decade 1909 to 1918, inclusive, was as follows:[1] deficient moisture, 12.38%; excessive moisture, 2.03%; floods, 0.33%; frost, 0.70%; hail, 1.10%; hot winds, 2.02%; storms, 0.26%; other climatic, 4.13%; plant diseases, 2.65%; insect pests, 2.12%; animal pest, 0.19%; other and unknown, .86%; total crop damage from all causes, 28.77%.

For the other crops the percentage representing the average annual crop damage for the 10-year period from all causes for the country, as a whole, were as follows: corn, 31.99%; oats, 24.52%; barley, 28.65%; flaxseed, 36.44%; rice, 19.04%; hay, 20.35%; potatoes, 30.12%; tobacco, 20.50%; cotton, 35.49%.

[1] Later figures may be obtained from the Department, but these figures, which the writer happens to have at hand, will serve equally well for purposes of illustration.

Translating the above 10-year-average percentages into quantity figures the average annual damage from all causes to the crops in question amounts to the following: corn, 1,345,600,000 bushels; wheat, 301,200,000 bushels; oats, 414,300,000 bushels; barley, 74,100,000 bushels; flaxseed, 10,200,000 bushels; rice, 7,400,000 bushels; potatoes, 164,800,000 bushels; tobacco, 296,300,000 pounds; hay, 20,414,000 tons; cotton, 3,731,000,000 pounds.

It has also been calculated that on the basis of prevailing prices during the different years the annual damage to the 10 crops amounted to a total sum varying from a minimum of $2,054,000,000 in 1912 to a maximum of nearly $3,066,000,000 in 1918, the average annual crop damage during the 11 years, 1909-1919, being, $2,620,000,000.

As will readily occur to the reader, the value figures just quoted represent in part only a theoretical diminution in gross income. Although an increase of 10% or 20% in the crop yield of a given farm will increase the gross income of the farmer by about the same percentage, this relationship between increase in yield and increase in gross income does not hold when all or even a large proportion of the entire farmer group is considered. In the latter case increase in yield will, of course, materially affect the total supply of the commodity in question and, therefore, the price received. No attempt has been made to allow for this fact in translating the quantitative crop damage into terms of dollars. Furthermore, if the true diminution in gross income to farmers by reason of crop damage were ascertained, such figure would still be of little assistance in determining the collective financial loss suffered by individual farmers on their yearly operations.

For the amount of actual financial loss suffered annually by reason of crop damage we have not even a reliable estimate. Such loss evidently cannot be arrived at by the use of general averages. In fact the annual financial loss may be said to be rather the product of the frequency and the extent of variations from averages in crop damage and in actual yield. In other words, methods of tillage and cost of production tend to adjust themselves to these averages, certain lands here and there being abandoned in connection with this adjustment. It is the unexpected, and not the expected, that results in financial loss or in extra profits, as the case may be. Furthermore, financial loss, as recent experience has amply demonstrated, may be suffered even with essentially perfect yields when agricultural prices are seriously out of line with the general price level.

By way of emphasis it may be said that crop damage is the difference between a perfect or no-damage yield and the actual yield, while financial loss is represented by the difference between the investment in the year's crop and the harvested crop figured at local market prices. Stating it another way, financial loss is the result either of crop damage, or of inadequate price, or both, to such degree as to bring the value of the actual yield below the investment in the crop. Since the conclusion has already been reached that insurance can wisely be provided only against loss resulting from severe crop damage and not against maladjustment of acreage, production, and resulting prices, it is the former rather than the latter class of losses with which we are here especially concerned.

The risk of crop damage not sufficiently severe to produce financial loss can be carried without serious incon-

venience by the farmer himself. In fact the attempt to protect himself against minor cases of crop damage is quite certain to prove uneconomical. No insurance organization can conduct its operations without considerable expense over and above its loss payments and such organization must, therefore, charge a premium which in the gross, for longer periods at least, exceeds in present value the amount paid out in loss indemnities. Insurance protection is necessary and desirable only against the possibility of losses sufficiently severe to hamper or cripple the individual in the continuance of his business.

Kind of Crop Insurance Needed

To give true protection against serious loss, crop insurance must necessarily cover all unavoidable hazards to which the crop is subject. If some of these hazards are left unprovided for in the insurance contract, in spite of the effort made to safeguard himself the insured may possibly lose his crop from a hazard not covered and find himself in severe distress. The ideal crop insurance contract must in effect guarantee the farmer that if his crop fails to produce a reasonable harvest, no matter what the cause of such failure, assuming that he himself has fully performed his part, he will be indemnified for at least a substantial part of the loss he has sustained.

It is hardly necessary to point out that in no case should the insurance safeguard a man against his own carelessness or neglect. Such insurance will necessarily create a form of moral hazard which no company can afford to assume. It will also, from a public point of view, tend to diminish the efficiency of agriculture as a source of national wealth.

Although to meet requirements fully the crop insurance policy must cover all unavoidable hazards, this does not necessarily mean that in the absence of such protection no insurance can wisely be purchased. In certain parts of the country the hail hazard is relatively severe. The average loss for a state by reason of hail is rarely, if ever, as large or as wide spread as the loss from certain other climatic hazards, but the loss to those who do suffer from it is often very severe. Not infrequently the crops of individual farmers are totally ruined. Because of this peculiarity of the hail hazard—losses therefrom being concentrated on a relatively few farmers and the damage therefrom being in general distinguishable from that brought about by other causes—it is practicable from the point of view of the insurance organization to give protection against this hazard alone at an expense ratio representing a moderate part of the premium. In true crop insurance, however, the hail hazard, as well as all other unavoidable hazards, should be included in a single policy.

In arriving at the amount of insurance per acre that can properly be written, the past record of the farm and the farmer is believed to be the only safe basis. Probably three-fourths of the average yield for a series of years past represents the maximum that can wisely be written. In any case the farmer must be co-insurer with the company to a substantial extent in order to eliminate as far as possible all moral hazard. Insurance up to the full expected yield would encourage reliance upon the insurance instead of upon the necessary personal effort. That all moral hazard should be absent is as much in the interest of the honest insured as in that of the company. The payment of unjust or self-inflicted loss-

es, in a given state or locality, is quite certain to be reflected in higher premium rates in the future for the territory in question.

Such a contract of crop insurance, if properly carried out, will in no way undermine the self-reliance of the farmer and will, it is believed, eliminate the so-called moral hazard as far as it is possible to do so through the form of the insurance itself. It will not guarantee the farmer any profits on the year's operations nor will it guarantee him full return of his investment, including wages for his own labor at current prices. It will, however, guarantee him against serious loss of accumulated capital and, in case a material part of the investment is the farmer's own labor, against serious or complete loss of wages or income from such labor.

A conservative contract of this type can be written, it is believed, at a rate that is little in excess of the rate now charged for hail insurance in the different states and parts of states. Hail insurance as at present written, it should be remembered, covers against partial loss of prospects as well as against a loss of prospects so severe as to bring about financial loss. Referring to the illustration used on a preceding page, the farmer who has in prospect a 24-bushel yield and suffers a 25% loss is indemnified under the prevailing hail insurance contract to the extent of 25% of the insurance carried per acre, and this indemnity is paid even though the 18 bushels harvested may, without the insurance indemnity, give a profit on the year's operations instead of a loss. Against the hail hazard the hail insurance contract in effect gives more protection than is actually needed, although, of course, it affords no protection against hazards other than hail. This defect in the hail insurance contract is fully realized by the insurance companies but as yet these companies have found it impossible, with minor exceptions of certain fruit crops, to devise a plan involving a different method of adjustment than that based on a percentage of the crop which has been lost through hail. Recent developments hold out some hope, however, of an all-risk crop policy that is sounder from an economic point of view.

Present Status of Crop Insurance

The first attempts at real crop insurance were made in 1917 when two joint-stock insurance companies and one mutual company offered general crop insurance in North Dakota, South Dakota, and Montana. This insurance covered all hazards to which crops are subject with the exception of fires, floods, and winterkill, and failure on the part of the farmer properly to till and care for his crop. The amount of insurance was fixed at the relatively low figure of $7 to $8 an acre and the insurance applied to a specified field area, the crops on which might include any or all of the following grains: wheat, flax, rye, oats, barley, and spelt. In case of total failure of the crop on such area, the company agreed to pay the face value of the policy. In the event of partial loss the indemnity provided for was equal to the difference between the value of the crop harvested on the field area insured and the face of the policy, it being specifically stipulated that the entire area insured in a given policy should be considered a single risk. Furthermore, the partial crop was valued at prices stipulated in the policy; namely, wheat, $1; flax, $1.75; rye, $0.70; oats, barley and spelt, $0.50 a bushel. The insurance, therefore, even though written in terms of money, cov-

ered yield rather than returns on a monetary basis. In other words, the insured was protected in a measure against serious crop damage but not against possible drop in the price of the crop produced.

These first attempts at general crop insurance proved rather disastrous for the companies that undertook them owing in part to the severe drought that occurred in large sections of the states mentioned and in part to inadequate safeguards by the companies against the assumption of risks after severe damage had already occurred. Finally, the risks accepted were concentrated in too small an area to give the proper territorial spread necessary in dealing with risks of the kind in question.

In 1920 and 1921 two of the larger fire insurance companies in the United States, and particularly one of these companies, wrote a considerable volume of general crop insurance. The insurance covered specifically against frost, winterkill, flood, drought, insects, or disease, but excluded the hazards of fire, hail, wind, and tornado, as well as failure of the seed to germinate, or failure on the part of the farmer properly to do his part in seeding, cultivating, or harvesting the crop.

The amount of insurance per acre was computed by allowing a fixed amount for each process in preparing the ground, seeding, cultivating, and harvesting the crop, plus an allowance for seed and rental value of the land, the intent of the insurance being to cover the actual investment in the crop. Adjustment of losses in this case was made on the basis of actual money returns, the company making good any deficiency in the returns below the insurance carried. The sudden and unprecedented drop in the prices of farm products which occurred during the summer of 1920 made this venture again a costly one for the company carrying the risk, the losses being about three times the gross premiums.

In 1921 some of the crop insurance contracts offered were revised in such a way as to make it possible for the company to settle losses either on a yield basis or on a money-return basis, under which plan the company could take advantage of price fluctuations in either direction. As might have been expected and in all probability was expected, only a small amount of insurance was sold under this plan. The fact that these contracts did not cover against hail damage also detracted seriously from their appeal to the farmer. The outcome of these first attempts at providing the farmer with more adequate insurance protection on his crops is regrettable, since it postponed, or at any rate retarded, the development of the only facilities by which the farmer who relies to any large extent upon one or two field crops can safeguard himself against serious loss.

Since 1921 the companies which have interested themselves at all in broader crop insurance have limited their activities almost entirely to the insurance of special larger risks, as a rule, of fruit or vegetable crops. These risks have been covered under individually drawn contracts. More recently, however, some of the insurance companies are beginning to realize that the earlier experiences in general crop insurance were somewhat haphazard and that there still may be a possibility of working out a plan under which the farmer may obtain at a reasonable cost the protection that he actually needs, without subjecting the company to possible losses greatly out of proportion to the premium income in any given year.

Among the questions involved in crop

insurance and yet to be answered is that of whether or not the farmer will buy insurance which indemnifies only against crop damage so severe as to involve a substantial financial loss. In other words, will not the fact that his collection of an indemnity is relatively remote deter him from buying, even though the rate be moderate and equitable and he does obtain protection against the possibility of severe financial loss? He may, for example, by reviewing past experience arrive at the conclusion that only once in 10 or 20 years is his yield likely to fall short to such an extent as to give him a serious financial loss. The chances are thus 10 or 20 to one that he will collect no indemnity for crop damage during a given season. In hail insurance as hitherto written the chances are considerably larger that he will collect at least minor indemnities at frequent intervals, and although this is naturally reflected in higher rates relative to the real protection afforded, it nevertheless appeals to him. Were he to protect himself in a similar way against all crop hazards even for minor cases of crop damage involving no financial loss, the rates of premium would certainly be prohibitive. In all probability it will require both time and effort, not only on the part of insurance organizations, but also on the part of the leaders in agricultural thought, before the American farmer in general will avail himself of an opportunity to eliminate the risk of serious loss by means of a comprehensive and scientific crop coverage, even after forms of insurance which meet his real need are made available.

Let us assume, however, that a suitable crop insurance contract has been devised and has been offered at a reasonable rate, and farmers in need of protection have become convinced of its value to them. Will they also show enough enlightened self-interest to give insurance organizations offering such a contract their moral support in helping to avoid or eliminate all fraudulent or excessive claims for indemnity, and thereby assist in keeping premium rates on crop insurance in their respective localities at a minimum? The moral hazard is one of the greatest problems in practically all forms of insurance and it offers peculiar dangers in connection with the insurance of crops. This is true not because farmers are less honest than other classes of men, but because of the peculiar nature of the property dealt with in crop insurance. Unlike the insurance of buildings or other objects which are already in existence when the insurance is written, crop insurance covers objects which must be developed into things of value under the care of the insured. If a dishonest and indolent grower succeeds in getting insurance up to or near the full anticipated yield, there is danger that he may wilfully neglect his crop and rely upon the insurance organization instead of upon his yield for the returns he expects. There is also the possibility of concealing or fraudulently reporting his actual yield. Unless the insurance organization has the general moral support of the community in which it operates, it will be difficult indeed for such an organization to guard itself against fraudulent claims, every one of which, if granted, will tend toward higher insurance costs in the future than would otherwise obtain or be justified.

In the long run the elimination of the moral hazard or proper safeguards against it is as much in the interest of the insured as in that of the organization carrying the insurance. The elimination of this hazard, even more than in most other lines of insurance, will re-

quire the good-will and support of at least a large percentage of those who take out insurance.

Crop insurance along the lines outlined in this paper represents, in the writer's opinion, the only means by which the hazards involved in crop production can be removed to such an extent as will bring the growing of crops to the level of our more stabilized industrial and commercial activities from the point of view of safety of investment and certainty of at least measurable returns. The wheat crop, corn crop, or cotton crop of the nation as a whole shows, of course, only relatively moderate variations in volume from year to year. But the crop of an individual farmer on a given farm involves a possible serious or total loss of the investment therein. Every year thousands of honest, energetic, and intelligent farmers, even in our best farming sections, suffer crop damage involving a financial loss which either bankrupts them or imposes serious sacrifice upon themselves and their families. With the farmer and planter largely carrying his own risk in keeping his acreage and the kind of crops that he produces adjusted to market demand, he should not, except possibly where diversification is exceptionally marked, be expected, or himself elect, to carry the risk of serious or total crop failure from weather and other hazards entirely beyond his control.

PUBLIC POLICY TOWARD RADIO BROADCASTING

By HIRAM L. JOME

FROM time immemorial air has generally been regarded as a free good. At the present time this situation is undergoing change, and conflicting private and public rights to use the air are emerging more rapidly than has been the case heretofore. The cause of this tendency to change from free good to property is chiefly the extensive development of the radio, although the aeroplane is also a factor. Before the advent of radio there was always more room in the ether than was demanded; now the situation is being reversed. The wide-spread desire for radio communication has so crowded the air with messages that the demand, except in the sparsely settled or backward regions, always exceeds the supply, and we find a tendency to assert property rights to particular wave lengths.

In some nations these rights are public and have virtually been guaranteed by international agreements. Some countries have seen fit to assign rights in part to private individuals subject to revocation with or without notice, retaining for the public only sufficient wave lengths to carry on the necessary governmental functions. An outstanding example of the latter policy is the United States. We find, therefore, not only that there are public property rights in radio, but when an individual has been granted a certain wave length by the United States Government, he often displays a tendency to assert his private property rights to that portion of the ether. Thus the evolution of free goods to economic goods and property is being re-enacted on a relatively small scale.

This growing demand for rights to use the air is raising such questions as: Shall the rights to use the air be public rights or private rights? If they are to be private, shall they be restricted or unrestricted? Shall these rights, when once granted, be subject to revocation? Should the government be required to grant an application for a concession? In many respects the history of the development of public utilities also repeats itself in these questions of public policy toward radio communication.

Nature of Radio Service

The radio renders a service of communication, the various types of which may be classified as follows:

- Radio
  - Telegraphy
    - broadcasting
    - point-to-point
  - Telephony
    - broadcasting
    - point-to-point

It will be noted that radio communication can be grouped in two ways: (1) when voice and sound waves of various kinds are transformed into electro-magnetic waves, carried through the ether, and reconverted into sound waves, it is called *telephony;* (2) when a message is transformed by hand or machine into a system of dots and dashes, carried through the ether, and by means of the proper rectifying agency, reconverted into dots and dashes to be read by ma-

chine or by ear, it is called *telegraphy*.

Both telephony and telegraphy may be of two general types. Messages, reports, dots and dashes, the voice, may be addressed to no one in particular so that any one who has the necessary apparatus, skill, ambition, and interest may hear. The transmitting station does not call any definite station or person; neither does the receiver acknowledge the receipt of the message. This is broadcasting. Then we have the system of point-to-point communication wherein the sending operator calls a certain receiving station, which must answer with the "go ahead" signal before the message will be sent. Such messages are always addressed. Even here there may be eavesdroppers, but the contents of radiograms may not be divulged to or by any unauthorized person under heavy penalty. There are also methods making for limited secrecy, such as the use of code, high wave lengths, and unusual rapidity of sending.

There are thus four kinds of radio communication. When using the term "radio," people ordinarily think in terms of telephonic broadcasting. But telephonic broadcasting, important as it may seem to the average man, is forced to take a place side by side with point-to-point telegraphy. The Radio Corporation of America, which has a monopoly of the American end of trans-oceanic point-to-point radio-telegraphic communication, handles about 30% of the messages crossing the Atlantic, and 50% of those crossing the Pacific. Practically all stations, except those licensed only to broadcast, do a large amount of their business through point-to-point telegraphy. Telegraphic broadcasting has been common for more than a score of years, especially for the sending of time and weather signals, news items, and orders to ships at sea. Point-to-point telephony has been used, but is not considered practicable or desirable, except for communication to isolated points or to ships at sea, because, due to the congestion of the ether, the land lines should handle all such conversation. Experience has taught that for point-to-point communication the system of dots and dashes is the best; whereas for broadcasting, telephony is the most adaptable.

In this article the writer will take up the problem of public policy and telephonic broadcasting, which is "radio" as 95% of the people use the term. There are equally important questions regarding other types of radio communication —for example, point-to-point telegraphy—but they will be excluded from the present discussion.

What will be the position of radio as compared with other agencies for the spreading of intelligence and entertainment? The wire telegraph interests very much feared the wire telephone. When Marconi succeeded in sending the letter "s" across the Atlantic in 1901, there was a panicky bear movement in cable stocks. But today both the wire telegraph and the telephone, both the submarine cable and the trans-oceanic wireless have prospered, for people send more messages. Pessimists who argue that the advent of radio broadcasting will empty the theater, the church, and the school, and will supplant the newspaper and the magazine, fail to consider the fact that the new fad will multiply popular interest in good music, religion, education, and news, and that in the future, there will undoubtedly be room for all these agencies. Radio communication may be termed a "supplementer," rather than a "supplanter."

To what uses will radio be extended? The rule seems to be: Do not utilize

radio in the rendition of a service when there are other just as efficient agencies able and willing to perform it. Thus, extensive point-to-point communication, whether by telephone or telegraph, is not desirable where there are adequate landlines. Point-to-point telephony is practicable between shore and ship, but not between shore and shore. The air should not be clogged with too extensive advertising which can be handled by the regular newspaper and magazine mediums. Telephonic broadcasting is especially desirable for the dissemination of information and entertainment of general interest among numerous scattered individuals, many of whom would not otherwise be able to benefit. For example, the radio has offered perhaps quicker and better service to farmers in the broadcasting of weather and market reports than have other agencies, and to that extent enables farmers to plan their day-by-day operations more successfully. Radio broadcasting furnished the people of the United States a plain view of the functioning of their party conventions, has enabled 25 million Americans to hear the inaugural address of President Coolidge, and has given people everywhere a chance to listen to the singing of Bori and McCormack. Thus radio will specialize in communicating things of general interest on a scale which is too large for existing agencies. To the extent that these services are necessary to a large section of the public and cannot be duplicated in timeliness and efficiency by existing agencies, the radio will fall within that class of services which at present are recognized as public utilities. It will readily be seen that much depends upon future radio development, both technically and from the standpoint of quality of service.

Development of Radio Broadcasting

Though radio is as old as the automobile, only recently has popular interest been aroused. Telegraphy, the earliest form, did not become a hobby with the people, largely because of the skill and patience necessary to copy and decipher dots and dashes. However, while wireless telephony was being perfected, the restrictions during the war period effectively checked wireless communication by private individuals. When the restraints were lifted, people only needed some one to supply the incentive for a tremendous interest in radio. This spark was furnished by the Westinghouse Electric and Manufacturing Company which on presidential election night in 1920 transmitted from its East Pittsburgh station the complete news of the Republican victory. So many listeners expressed pleasure at this service, and so great was the resulting demand for electrical and radio equipment in the vicinity of Pittsburgh, that the Westinghouse Company, deciding to enter the field permanently, applied for and received permission from the United States Department of Commerce to broadcast regular announced programs.[1]

The radio became a fad especially in the United States. We are known as a nation enjoying the maximum of individual freedom with the minimum of official restriction. Few formalities are

[1] The impression must be avoided that the Westinghouse station was the first to engage in telephonic broadcasting. DeForest and Fessenden had succeeded in broadcasting the human voice in 1908, some claiming that the latter had projected his voice across the Atlantic in that year. At about this time Caruso sang by radio to a few scattered listeners. By December, 1916, the American Radio and Research Corporation was broadcasting concerts two or three times a week.

TABLE I. PURPOSES OF BROADCASTERS

Purpose	Total	Number of Stations Reporting as the Only Purpose	Number of Stations Reporting as One of Two or More Purposes
To help maintain sale of receiving sets.....	31	2	29
To profit from advertising received and goodwill developed	44	8	36
To profit by direct sale of advertising time..	2	0	2
To serve public generally.....	146	46	100
To serve some special group or clientele....	26	6	20
Research purposes.....	13	4	9
Police information.....	8	2	6
University extension work.....	1	1	0

necessary for the erection and operation of transmitting stations and none at all for the establishment of receiving sets. In most foreign countries, on the other hand, the private use of radio is narrowly restricted by governmental regulations. Hence, the last decade has seen a great increase in the number of radio sending stations in the United States.[2]

Another factor in this expansion is the motivation of those who establish broadcasting stations. On this point the replies received in response to the writer's questionnaire to broadcasters throughout the United States are suggestive. (See Table I.)

If this is a fair sample, most broadcasting stations were established for some private end and only incidentally to serve the public generally.

Problems of Radio Communication

Although our generally laissez-faire attitude toward the radio has been beneficial to the development of the science and to the popularity of this form of communication, it has at the same time resulted in many economic problems which more or less parallel the service problems of recognized public utilities. Generally speaking, these outstanding problems pertain to the quantity, quality, continuity, and control of the service of radio communication.

Quantity of Service

Some idea of the quantity of telephonic broadcasting service now available to consumers can be gained from the distribution of the 555 licensed stations, as shown in the map reproduced on page 202.[3] It is to be noted that California boasts 44 stations, Pennsylvania 35, Texas 30, New York 28, Ohio 29. The three Pacific Coast states have 75 stations, whereas the Atlantic states have 135.

This may seem to be a fair distribution, but radio resources cannot be measured merely by the number of stations; their power also must be considered. There are altogether 121 stations in the United States having a wattage of 500 or over. Ninety-two of this total are in

[2] In 1913 only 483 American commercial vessels carried radio apparatus; by 1924 this number had increased to 2,741. In 1912 there was only one trans-oceanic station in the United States; today there are 12. Government land and ship stations have increased in number from 77 and 229, respectively, in 1913, to 298 and 951 in 1924. The 1,224 licensed amateur sending stations in this country in 1913 have multiplied to 15,545 in 1924. The exclusively broadcasting stations have increased from 3 in September, 1921, to 555 in January, 1925.

[3] The figure, 555, was for January 1, 1925. The stations included in the map were those in operation on July 1, 1924.

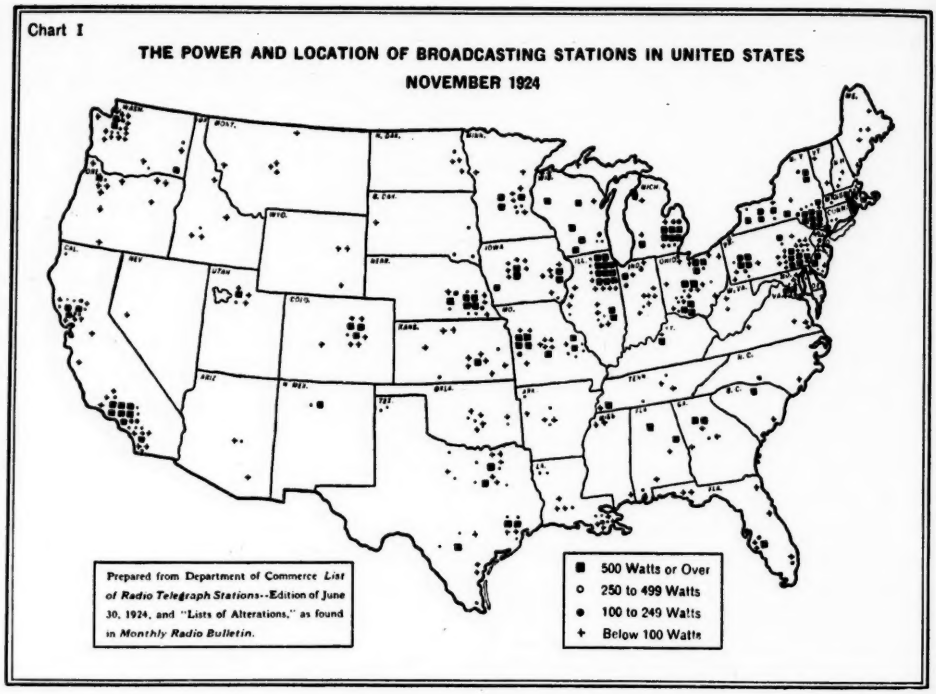


Chart I
THE POWER AND LOCATION OF BROADCASTING STATIONS IN UNITED STATES
NOVEMBER 1924
Prepared from Department of Commerce List of Radio Telegraph Stations--Edition of June 30, 1924, and "Lists of Alterations," as found in Monthly Radio Bulletin.
500 Watts or Over
250 to 499 Watts
100 to 249 Watts
Below 100 Watts

New York, Pennsylvania, Illinois, Ohio, California, Michigan, Missouri, Texas, Nebraska, Minnesota, and Wisconsin. In other words, 76% of the stations of 500 watts or over are in 23% of the states. New York state has 17 of these high-power stations, while Montana, with three times the area, has none.

If apportionment of stations according to resources and population is a measure of good distribution, New York may be justified in its large number of high-power stations. But atmospheric conditions and area are additional factors that should be considered. The act of reception itself does not weaken radio signals, just as the human voice, carried by means of sound waves, can be heard by all within range without loss of strength.[4] Thus, in many parts of the East radio messages can, if necessary, be intercepted by means of cheap crystal sets which have a sound range up to 25 to 50 miles, whereas in certain isolated sections of the West listeners must use expensive multiple-tube receivers in order to hear the nearest station.

Consequently the present more or less haphazard distribution of broadcasting facilities tends to result not only in virtual sectional discrimination but also in interference—interference of one message with others is the bane of the radio enthusiast's existence. Furthermore, interference has been aggravated by the

[4] There are, however, certain atmospheric obstructions, and physical obstacles affecting atmospheric conditions, which interfere with the reception of messages. (See *Wireless Age*, May, 1924, p. 47.) It is interesting to note also that instances are recorded where obstructions to good radio service have affected the desirability, and values, of residential real estate. (See *Literary Digest*, February 14, 1925, p. 23.)

"mushroom" growth of broadcasting and by a tendency toward concentration of control and the elimination of financially weak, low-power stations. At the present stage of technical progress the number of passes through the air is limited. All broadcasting stations operate on wave lengths between 200 and 545 meters. But, as Secretary of Commerce Hoover has said:[5] "Within this range we have about seven possible bands for sending in any one community. The number of telephone or broadcasting stations that can be operated from any one place is, however, more limited than this because of interference of one locality with another. * * * No doubt the number of available wave lengths will steadily increase with improvements in the art and better adjustment between different purposes." As the reader will note on the map, many localities have more than seven broadcasting stations. Hence, there is interference, as can be attested by a large number of radio "listeners in." The interference, however, is not only among the broadcasting stations. In 1924 there were 2,741 American commercial ship stations, 951 government ship stations, 298 government land stations, 15,545 amateurs, and 12 transoceanic stations. The first four of these classes operate on wave lengths which may more or less interfere with broadcasters.

Unless technical advances remedy the situation, the tendency will be for certain stations to establish property rights to wave lengths as a protection against interference. In effect, this is what happens when wave lengths are assigned by the licensing authorities.[6] The combination of asserting property rights and interference is likely to result in conflicts, or, in order to minimize interference, in abstention from service—thereby disappointing receivers.

Another possible result is a tendency toward concentration of control of service. Experience has shown that railways are a natural monopoly because of the great proportion of fixed to operating expenses and because of cutthroat competition in the case of rate wars resulting ultimately in unity of action. Even though we ignore the possibility of concentrated control by means of control of fundamental patents, radio communication of the type being considered is in an analogous situation, for it is a business in which the number of individual concerns is limited on account of physical or economic conditions.[7]

Continuity of Service

Another aspect of the service problem, from the standpoint of both quantity and quality, is the duplication of programs. Under our present broadcasting system there is a large amount of waste. We say that capital is wasted when two or three telephone companies serve the same community. Likewise, if several broadcasting stations duplicate their service, there is loss to the community of receivers. One radio fan heard the song, "I Love You," "11 times in one night." This is probably a record, but the rendition of the same piece of music and the announcement of identical news items during the same evening are not uncommon.

In the case of recognized public utilities continuity of service is a standard requisite of adequate service. In the

[5] Statement of Secretary Hoover before the Committee on the Merchant Marine and Fisheries of the House of Representatives in regard to H. B. 7357, a bill to regulate radio communication, March 11-14, 1924, p. 9.

[6] These wave lengths may at any time be changed by licensing authorities.

[7] *Post*, pp. 204-206.

case of radio communication there are no restrictions preventing broadcasters from ceasing to operate, and the discontinuance of service is assuming large proportions. The United States began to license broadcasting stations in September, 1921. By August, 1924, the Department of Commerce had licensed 1,105 broadcasters, but only 533 had survived; 572 had fallen by the wayside, indicating a total "mortality" of more than 50%. In other words, for every two stations granted a permit, one has ceased operation.[8]

The question of discontinuing business is mainly a concern of the broadcaster alone, but it has significance also from the consumers' standpoint in so far as the consumer comes to prefer, and depend upon, the service of a particular station.

This high "mortality rate" is apparently due chiefly to three factors: the large capital investment, high operating expenses, and the absence or intangibility of the income. Table II, below, prepared from answers to the questionnaire previously mentioned, indicates the relative importance of capital outlays among 106 broadcasting stations.

It will be noted that 51 stations, or almost one-half, indicated a cost of $3,000 or less. These are almost entirely the stations of colleges and churches. Eight stations, or almost 8%, reported an initial expense of more than $50,000. These are, as a rule, constructed by large manufacturers or dealers in radio. Fifteen reported an original outlay of more than $25,000, while one dual station revealed an expense of $400,000.

Variations in the cost of installation are due primarily to the fact that some stations are built without purchasing the Western Electric sets; in colleges the parts are constructed in the physics department; construction costs of buildings are not included in the case of stations housed in sheds or attics; and there is also the difference in the power and elaborateness of the machinery installed.

Operating Costs

The cost of operation, as given in Table III, shows one of the chief reasons for the great number of stations discontinuing business.

Among the reasons for the variations in the annual operating costs of the different stations may be mentioned:

[8] These figures are computed from data furnished to the writer by courtesy of W. E. Downey, Supervisor of Radio in the Bureau of Navigation of the United States Department of Commerce.

TABLE II. EXPENSE OF INSTALLING BROADCASTING STATIONS

Expense of Installing, in Dollars	Absolute Number		Percentage	
	Simple	Cumulative	Simple	Cumulative
0 — 1,000 Inc.	12	12	11.3	11.3
1,001 — 2,000	20	32	18.9	30.2
2,001 — 3,000	19	51	17.9	48.1
3,001 — 5,000	14	65	13.2	61.3
5,001 — 10,000	11	76	10.4	71.7
10,001 — 25,000	15	91	14.2	85.9
25,001 — 50,000	7	98	6.6	92.5
50,001 — 75,000	3	101	2.8	95.3
75,001 — 100,000	2	103	1.9	97.2
100,001 — above	3	106	2.8	100.0

1. Many stations, such as schools, churches, and hobby stations, operate only part time at irregular intervals, and the work is done by non-paid persons.

2. Only a few of the broadcasters are making any payment for the services of the artists and performers. Home talent is used, but the demand for compensation is increasing. Some stations pay regularly for services, others only occasionally.

3. Some must pay copyright royalty fees, usually $500 a year, while colleges pay only a nominal fee of $1. Others are paying no fee at all.

A striking characteristic is the fact that the operating costs of the broadcasting stations are large in comparison with the initial expense of installation. In many instances the former are larger than the latter, while the average expense seems to be about $75 a year for keeping the station going in comparison with $100 in original outlay. That is a ratio of three to four. It seems, therefore, that the great financial burden is not so much the expense of installation as the cost of upkeep.

Income from Radio Broadcasting

The relation of operating costs to original outlay is insufficient explanation by itself of the high "mortality rate." Broadcasters of the type being considered have little or no direct income. Several stations are supported by interested business men or clubs. Church stations continually receive donations from the members of the congregation. Students and alumni help support their college broadcaster. Such contributions can, however, be considered as payments by the owners, be they congregations, student bodies, or business clubs. Though a small number of broadcasters indicated that occasionally they received a check from a far-off "listener in," only 3 out of 110 reporting stations stated that they received more or less regular contributions from their radio audiences. This business aspect is not often remembered by radio "fans."

Up to a recent date, the American Telephone and Telegraph Company station was the only one which charged for advertising. For example, its station will permit any concern to broadcast a program and announce its name and position in connection with the rendition. For such advertising WEAF charges $10 a minute or $400 an hour. But even the American Telephone and Telegraph Company has stated that its broadcasting is unprofitable, "receiving a revenue of less than

TABLE III. ANNUAL OPERATING EXPENSES OF BROADCASTING STATIONS

Operating Expenses, in Dollars	Absolute Number		Percentage	
	Simple	Cumulative	Simple	Cumulative
1,000 — or under	39	39	42.4	42.4
1,001 — 2,000	11	50	12.0	54.4
2,001 — 3,000	9	59	9.8	64.2
3,001 — 5,000	8	67	8.7	72.9
5,000 — 10,000	9	76	9.8	82.7
10,001 — 25,000	7	83	7.7	90.4
25,001 — 50,000	3	86	3.2	93.6
50,001 — 75,000	2	88	2.1	95.7
75,001 — 100,000	1	89	1.1	96.8
100,001 — above	3	92	3.2	100.0

half the operating expenses" in 1923.[9]

The ordinary broadcaster has, then, no source of direct income. He relies on the indirect benefits, such as the building up of good-will. But these indirect receipts are very uncertain. In his questionnaire the writer asked the broadcasters to state the average number of applause cards received after each program and also whether this number was considered satisfactory. Of the broadcasters replying, 36% answered in the negative. A considerable number of those commented that the response from their audiences is "not what it used to be." Only about one-fifth of the stations reported difficulty in obtaining talent, but of this small number three said the complaint was "lack of appreciation." The point is this: If a large percentage of the audiences are not interested in, nor appreciative of, the programs rendered for them free of charge, there seems to be a good reason to believe that the indirect gain through advertising and notoriety may not be very great. With large sums of money going out, and uncertain and unmeasurable indirect benefits coming in, many stations are asking themselves the question: "Does it really pay?" Broadcasting may have been profitable for the first in the field, but the situation seems to be changing now that the novelty has worn off, the stations are many, and the radio fan has a wide choice of programs. That broadcasting does not always adequately compensate the owner is presumably indicated by the heavy mortality rate.

"Last winter," writes the proprietor of a middle-western 500-watt station, "our talent cost us $700 per month, besides $200 for an operator and many other expenses too numerous to mention. We have put about $50,000 of our money into radio during the past 12 months and we have never received back one dollar in cash returns. We no doubt have lots of good-will and are nationally advertised, but we can't cash in on our advertising. Furthermore, we cannot see our way clear to withdraw; we have too big an investment to throw it away; yet, every day we stay with it, we put in more money without hope of cash return." [10]

This raises a fundamental question: Whether the service rendered by radio broadcasters is affected with a sufficient public interest to justify more stringent regulation. Presumably if the consuming public is apathetic, if it shows no appreciation of, or desire for, more and better service, a claim to the public interest in radio service would fall of its own weight. In other words, if the radio is only a fad, and the fad is waning, it would seem absurd to seek to regulate it in the public interest.

It is difficult to obtain adequate information on this point. We know that over $400,000,000 has been invested in receiving apparatus and that this demand continues more or less unabated. But there is no adequate way of learning whether this initial enthusiasm, which prompts the purchase of receiving sets, is sustained. It is well known that radio audiences are becoming more critical of the service offered, just as performing artists and holders of music copyrights are demanding compensation which boosts the operating expenses of those broadcasters who try to give better service.

[9] See *Hearings before House Committee on Merchant Marine and Fisheries,* in H. B. 7357, a bill to regulate radio communication, March 11-14, 1924, p. 88. Testimony by Mr. Harkness, a vice-president of the Bell System. Mr. Harkness stated that the cost of operating WEAF for 1923 was about $250,000, and that the revenue to the company, including that from its licenses to other companies, was "less than half that amount."

[10] Letter to writer, dated July 24, 1924.

The test, however, is rather with those receivers who have regarded radio service as indispensable to business or existence and neither duplicated nor possible of duplication by other agencies with the same efficiency. If this group is a small minority, or if it finds that it can dispense with the radio without loss of efficiency, one can hardly claim with reason that telephonic broadcasting is affected with sufficient public interest to justify regulation.

Farmers probably constitute the largest single group of radio service consumers who would be likely to come within this class. The United States Department of Agriculture, not to mention agricultural colleges and experiment stations, has arranged since 1921 for broadcasting marketing news and weather reports. The nine stations, which in January, 1922, were licensed to broadcast market reports, increased in number to 86 in January, 1924.[11] The number of farmers having receiving sets has increased steadily to "more than 370,000" in 1924, it is estimated.[12]

The value of broadcasting service to farmers is perhaps best indicated by the results of the radio conference sponsored by the Department of Agriculture in December, 1924. The superintendent of radio operations of the Westinghouse Company stated to the conference that "radio broadcasting's greatest mission in this country would probably be the serving of American agriculture." "Hundreds of thousands of dollars' worth of live stock and other property have been saved by a knowledge of weather conditions made possible by radio broadcasting," was the statement of the official in charge of the forecast division of the Weather Bureau. As an illustration of the farmers' appreciation of the educational value of the radio, the experience of the Kansas State Agricultural College was cited. In 1923 this college, using a privately owned station, broadcasted 12 extension courses on various subjects to an enrolment of 967 people; and of this number 311 took the examination scheduled at the end of the 10-week course.

Finally, it may be noted that the public importance of radio broadcasting was recognized by this conference when it unanimously adopted a resolution which included the following recommendations:

1. That agricultural radio broadcasting be extended as rapidly as the evidences of need justify, and reliable broadcasting facilities become available, until all parts of the agricultural community are reached with a satisfactory and regular service.

2. That the attention of all broadcasting station operators be called to the vital importance of using only accurate and dependable information and to the dangers of broadcasting unauthentic information and propaganda, and that we urge that every means be employed to protect the listener from deception of all kinds.

3. That, in addition to the character of the material, especial attention be given to the timeliness and continuity of broadcasting periods, and that all governmental agencies responsible for the direction of radio recognize the farmer's interest in timely information.

4. That we recognize the great importance of weather reports and storm warnings to all on land and sea and lakes.

5. That the present cooperative supervision of the broadcasting of market reports by federal and state marketing agencies be continued to the

[11] *Official Record*, United States Department of Agriculture, December 17, 1924, p. 1.

[12] *Ibid.*, September 24, 1924, p. 3.

end that the farmer be not confused by conflicting reports.

6. That the consumers' interests in agriculture be recognized, and that broadcasting stations in population centers be urged to give consideration to the use of suitable material on agriculture which will promote a better understanding of the farm situation, and also aid the consumer to buy farm products in season and to best advantage.[13]

When all has been said, however, the question whether telephonic broadcasting is actually or only potentially a public utility can probably not be answered with finality until the service has become more stabilized, particularly the quality of programs and service rendered. It is possible, nevertheless, to cite current tendencies, including the above, pointing toward public utility status.

Present Policy of Control of Service

Radio communication in the United States is still operating under the Wireless Regulation Act of 1912, stipulating that "A person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication—except under and in accordance with a license revocable for cause—granted by the Secretary of Commerce upon application therefor." Under this act wave lengths have been assigned according to the following grouping: amateurs, 150 and below; broadcasting stations, 200 to 545; commercial ships, 560 to 835; limited commercial service stations, 2,600 to 2,700; the Postoffice Department, 3,000 to 4,200; the United States Navy, 600 to 1,600; the trans-oceanic stations of the Radio Corporation, of America, 12,000 to 16,000.[14]

This act, however, gives the Secretary of Commerce no discretion in the granting of licenses. His only discretion is in the assignment of a wave length. This question of the power of the Secretary was the issue in the case of *Hoover* v. *Intercity Radio Company*.[15] In January, 1924, Secretary Hoover refused to renew the license of the Intercity Radio Company for one of its stations on the ground that no wave length was available which would not interfere with private and government stations. In other words, this was an attempt by the United States Government to prevent interference through a refusal to grant a license to a transmitting station.

The company petitioned the Supreme Court of the District of Columbia for a writ of mandamus directing the Secretary to issue the license. The writ was granted, and Mr. Hoover appealed to the Circuit Court of Appeals, which affirmed the decision on the ground that Congress, and not Mr. Hoover, had the power to regulate fully the radio business. Congress had not delegated any discretion to the Secretary of Commerce, but had merely commanded him to grant the license when certain requirements had been met by the applicant. The issuance of a license was a ministerial act.

That this system of control does not meet the situation adequately is recognized, if we may judge from the opinions expressed at the Radio Conference called by Secretary Hoover in October, 1924. Nevertheless the recommendations of this conference were palliatives rather than real solutions of the problem. For example, to make more room in the air for broadcasters, this conference lowered the amateur

[13] *Op. cit., Official Record,* December 17, 1924.

[14] These figures incorporate the results of Secretary Hoover's Radio Conference in October, 1924.

[15] 286 Fed. 1003.

wave lengths to 150 and below and raised the commercial ship wave lengths to above 600, the 560 and 600 meters to be used only for calling and distress signals. It is evident that as soon as this extra space is taken up by the broadcasting stations, the situation will be as serious as before.

In this connection it is interesting to compare the American policy with that of other nations which, generally speaking, have adopted policies of more rigid control, despite their relative backwardness in many phases of technical development. British policy may be taken as an illustration.

British Policy and Control

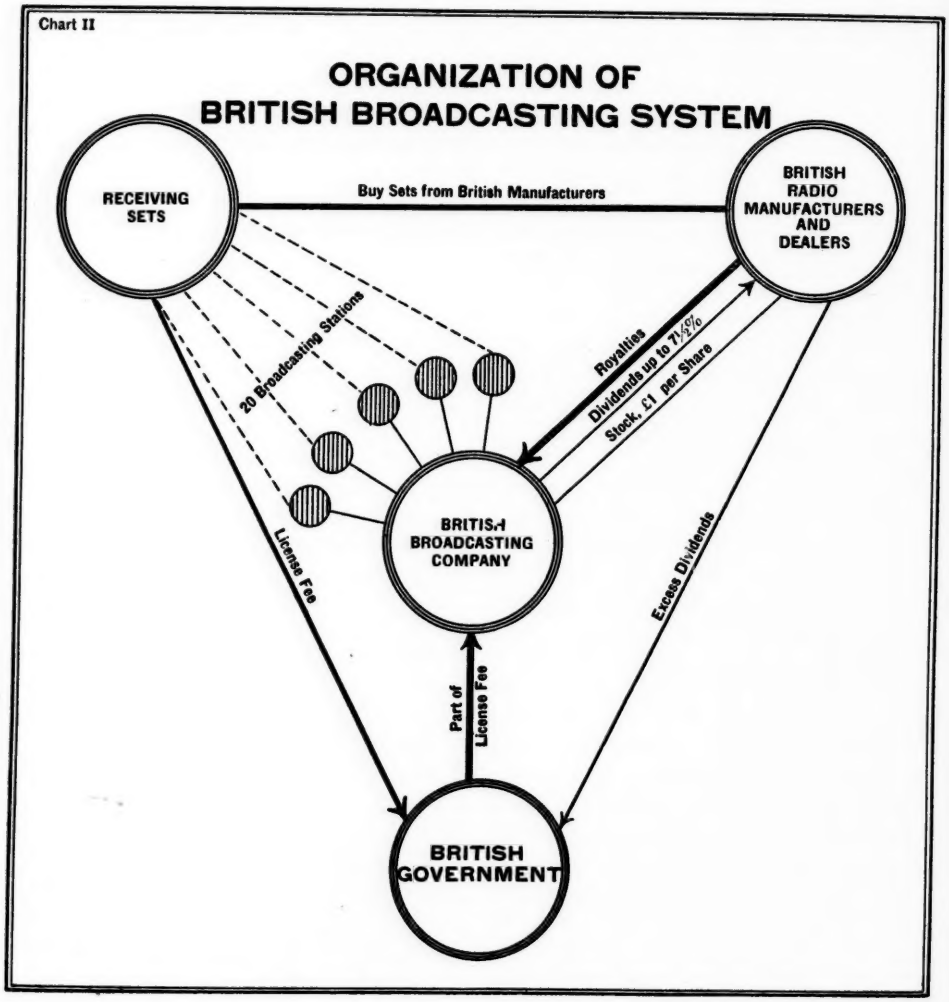
The policy of Great Britain avoids many of the evils of the American system. The power to license and regulate wireless stations was given to the Postmaster General under the Act of 1904. When the great clamor for broadcasting facilities arose, this official foresaw difficulties. Accordingly, in May, 1922, he called a conference of firms who had applied for the broadcasting privilege. It was made plain to the conference that if all applicants were granted licenses, there would be too many stations, resulting in interference and duplication of service. Consequently two principles of regulation were put into effect: (1) the number of broadcasters must be limited, and (2) the licensed stations must be so located as to serve the whole country efficiently and without discrimination.

The result of this policy was the formation of the British Broadcasting Company which any radio manufacturer or dealer may join by subscribing for one or more £1 shares and by depositing £50. In February, 1925, there were 20 broadcasting stations licensed and operated by the company. Thus in reality every radio manufacturer or dealer who is interested in broadcasting has an opportunity to enter into the business indirectly through stock ownership in the company. Some of the regulations imposed on the company are as follows: The company is not to broadcast any paid advertising, or any news except such as it obtains from the four authorized news agencies; it will broadcast weather reports without compensation; the programs must be to the "reasonable satisfaction" of the Postmaster General; the hours of broadcasting are limited to specified hours and the wave lengths are limited to 350-435 (except the "blanket" station at Chelmsford, which has a wave length of 1,600 meters) and the power to 3 kw.; the company is to allow any British radio manufacturer or dealer to become a member; a license fee of £50 a year is paid to the government by each station; the profits of the company are limited to 7½% on the investment and a reasonable reserve, any surplus profits to accrue to the government; the company's license is revocable for cause. Other regulations that have been adopted are: All receivers pay a fee of 10 shillings a year, which is divided between the company and the government; manufacturers of radio sets pay to the company a fee ranging from 1 shilling to 17 shillings 6 pence per set sold, depending on the type; the Postmaster General may license any additional broadcasting service.

Up to the latter part of 1924 the number of receiving licenses sold was about 1,000,000. At 10 shillings a set, the revenue from this source is £ 500,000, of which the company receives three-fourths, or £375,000, the government retaining £125,000 for administrative expenses.

Owing to the even distribution of the stations throughout Great Britain, the receiving public is so near to the broadcasting facilities that crystal sets are in predominant use. There is no dividing of time among the stations, so that all work to the full capacity during the allotted hours. Each station has an orchestra. Artists, speakers, and copyright fees total £2,000 a week or £104,000 a year. The general policy is to pay for all entertainment.

Favorable reports are heard from all sides concerning the British system. Its advantages are: (1) provision for simultaneous broadcasting; (2) the reduction of social waste through the elimination of interference, the ability of stations to operate at full capacity, and the proper distribution of broadcasting facilities; and (3) the provision of an adequate system of payment so that satisfactory programs can be supplied.



Public Policy in the United States

In the face of the problems outlined above and the British solution of them, what should be the policy of the United States? Four possible courses of action are open.

1. Continuance of the present system. This is the policy favored by those who believe that the situation will adjust itself. It is even contended that the need for the present restrictions will be eliminated when technical progress makes more wave lengths available. This laissez-faire attitude is based on the suppositions that stations will be able to survive on the basis of indirect advertising, that if a station cannot survive its existence is economically unjustifiable, and that telephonic broadcasting service is not affected with that degree of public interest which justifies stricter regulation. Essentially this is a "survival of the fittest" doctrine, based upon free competition and unrestricted private rights to use the air.

It should be pointed out, however, that the mortality rate has been highest among low-power stations and has resulted in an increasing number of high-power stations in the populous districts. This raises the question, which has not been conclusively determined as yet, whether sparsely settled areas will be adequately served—a question which interests farmers especially.

2. A second possibility is the amendment of our present radio laws so as to give the licensing authorities wider discretion in granting permits. This was one of the purposes of House Bill 7357, which was under consideration in March, 1924. Besides giving the Secretary of Commerce power to classify stations and to determine the nature (quality) of the service to be rendered, the bill stipulated that "The Secretary of Commerce *if in his judgment public convenience, interest, or necessity will be served thereby* (italics the writer's) and subject to the limitations of this act, *may* grant any applicant therefor a station license—for a term not longer than ten years." The bill prohibited monopolies and provided for revoking licenses for cause.

Though this bill has obvious advantages, it was not enacted into law. Under it the Secretary would have had power to decide when and where stations may be erected. The anti-monopoly provision was also valuable, though possibly allowing the Secretary too much discretion, since he, and not a court, was to decide when and where monopoly or monopolistic intent existed. The term of the license was to be lengthened from 2 years (under the present law) to 10 years. The purpose of this extension was to protect the property rights of the licensee. He would have the right to operate at least 10 years before his license could be withdrawn except for cause. It will be noted that the Secretary might at the end of the term refuse to renew. He does not possess this power under the present law.

This bill, however, would not remedy the present maldistribution of broadcasting facilities. Private individuals would not, under it, be induced to erect stations in the sparsely populated areas, although the Secretary was apparently vested with power to minimize interference through the regulation of the number and location of stations.

3. A third alternative is the establishment under strict governmental regulation of a system of private super-power stations with a maximum power of, say, 10 kilowatts. Such a scheme would be analogous to our present policy of regu-

lated private monopoly in the public utility field. The government could initiate this policy under the second possibility listed above. The 1924 Radio Conference suggested the provisional licensing of stations up to 5 kilowatts, and several have already received permission to increase their power.

Each super-power station in this plan might be granted an exclusive territory with a system of relaying and rebroadcasting so that one program could be broadcasted throughout the country at one time. The government also might license low-power stations (up to 100 watts), which could operate independently and also serve as relaying agents for the larger concerns. Thus, private initiative would be preserved and stimulated. The low-power and the super-power stations would function together much as the metropolitan and the small-city newspapers, each performing its peculiar function. In order to prevent the super-power stations from drowning out their smaller brothers, they should be assigned special wave lengths and should always be located at least 25 miles from the great centers of population. Thus, as radio signals decrease in strength very rapidly as they leave their source, the radio audience could readily tune out these lesser stations, whenever they prefer. Still there might be the difficulty of inducing private individuals to erect stations in the thinly populated regions, because stations do not pay in these sections. In order to stimulate the construction of stations in the sparsely settled areas, as well as to provide adequate programs including the payment of fees to the performers and royalties to copyright holders, provision might be made for subsidizing high-powered concerns by the United States Government. The low-power stations should receive compensation when they acted as relayers, but any one of them should be permitted to remain, if desired, outside the system subject to government regulations.

It will readily be seen that the above policy is premised upon recognition of the public interest in good radio service —adequate quantity, quality, and continuity of service. As far as existing radio problems are concerned, the above policy may facilitate the elimination of interference and assure good quantity and continuity of service. But unless the license included provisions as to the quality of service, this phase of radio problems might remain unimproved under private initiative. It is well to remember that the type of broadcasting programs will be perhaps the major factor in determining whether radio service is sufficiently important to the public to justify regulation.

4. A fourth alternative is the establishment of a system of super-power stations (not more than 10 kilowatts) under public ownership and control. The main features of such a system might be as follows:

(*a*) The country would be zoned into districts according to area and atmospheric conditions.

(*b*) A Bureau of Communication would establish at an appropriate place within each zone one large public station with a maximum of 10 kilowatts.

(*c*) Private broadcasting stations might be authorized with a low power not exceeding 100 watts, since any system of government enterprise of this kind is apt to be deadening to private initiative. These private stations could be divided into two groups, A and B, the licensing of both classes to be within the discretionary power of the regulating authorities.

(*d*) Group A stations might serve as government substations for the purpose

of relaying programs within the zones, broadcasting special items of only local interest, and performing certain police duties such as the detection of interference from oscillating receivers. For these services the Bureau of Communication might make payment, although these stations might also be permitted to broadcast certain programs of their own.

(*e*) Group B stations would be those which do not desire to become government substations, and would be in practically the same position as the broadcasters of today.

(*f*) The Bureau of Communication would pay for talent, copyright royalties, patent rights, besides ordinary expenses. The right of private property in the copyright and the patent should be protected.

(*g*) The central stations would sell a limited amount of advertising time.

(*h*) All the central stations would be so constructed as to make rebroadcasting possible.

(*i*) Government expenses might be met out of the proceeds of a gross sales tax on manufacturers of radio apparatus. Such a tax would probably fall eventually on the users of radio service —the consumers—and would eliminate the necessity of licensing receivers and obtaining funds in that way. This tax should be relied upon also in the case of the third alternative above, in order to enable the government to subsidize private broadcasters.

(*j*) Army and navy wireless stations which at present are not subject to the civil authorities would be brought under sufficient control to prevent undue interference with other stations.

A policy either of regulated private monopoly or of public monopoly, as just outlined, would probably require a regulating commission with powers substantially like those now exercised by the Interstate Commerce Commission or various state public utility commissions. To such a board might also be delegated the power of regulating telephones, telegraphs, and cables—in fact all agencies of communication, present and prospective, whose service is interstate in character.

A public ownership and operation plan, like the one sketched above, is obviously open to the objections that private initiative will be stifled, that the government might attempt to dictate what the people may or may not hear, thus restricting the right of free speech, and that we already have too much centralization of authority in the Federal Government. Safeguards against the first two objectionable features might be found in giving fairly liberal rights to low-power private stations. As for the last objection, if radio broadcasting is to be regulated at all, the interstate character of the service makes the Federal Government the only practicable regulating authority under our constitutional law.

The crux of the problem, in this as in all policies of stricter regulation, is the public importance of radio service. As long as fans look upon the radio as one of many sources of entertainment, it is questionable whether the courts would construe favorably a law embodying more stringent regulation than now prevails. As more and more of the radio public, particularly farmers, come to regard the service as a necessary and non-reproducible utility of communication, more stringent regulation becomes both economically desirable and legally possible. And, if a prediction may be hazarded, the new public policy will in general follow the tendency of the third alternative listed above. The tendency toward super-power broadcasting is seen

from the action of the United States Department of Commerce in provisionally licensing stations up to 5 kilowatts, and in the steps taken by private companies, such as the Westinghouse and the General Electric, in establishing chains which will enable them to "blanket" the greater portion of the country. The organization of a chain of stations to broadcast President Coolidge's inaugural address on March 4 is also of significance, in that it shows a natural tie-up and community of interest among some of the large private broadcasting stations. Such a prediction at least would follow the general lines of the development of public utility regulation.

TAXATION OF LAND IN AUSTRIA

By JOHN V. VAN SICKLE

TAXES are paid normally out of income. It would seem sensible, therefore, to levy them directly against income. Experience, however, has shown that this is difficult in the case of land income. In no country and at no time have assessors been able to determine accurately the true land income of farmers, and they have succeeded hardly better with urban real estate owners. Where leasehold predominates, as in England, a satisfactory substitute is possible. Elsewhere, however, some indication of income, rather than true income, must be used.

In the United States the capital value of land is thus used. The frequency of sales makes reasonably accurate assessment possible, if sales records are properly gathered and analyzed. Although assessment considerations favor the use of capital value in this country, there is nevertheless one theoretical objection which deserves attention. Land value represents something else than present capitalized earnings of land. In a rapidly growing community it represents in addition the capitalization of expected future increases of income, as indicated by the experience of the recent past.[1] Vice versa, in a declining community, it represents less than capitalized present income. The expected further decline in income is discounted in advance. In the first case the state treasury benefits. It takes in advance a portion of the anticipated future increase of income. In the second case, obviously, the public treasury suffers. During the transition from a high level to a low level of prices, the position of the taxpayer is particularly hard. Land values remain high for some time, due to the belief that the new situation is temporary. Taxes, therefore, remain at the old level or even increase, despite the fact that land incomes are declining. This is one reason for the exorbitant taxes, as measured against income, which the farmer has had to pay during the last few years.

Since capital value is merely an indication of land income, it may be of interest to examine indicia used elsewhere. The European land taxes represent the most significant experiment with external indicia of income. Futhermore, they are interesting because of the use they make of land classification—a field in which we have much to learn. Finally the accurate *cadastres* of Europe deserve to be better known here where slip-shod methods of mapping land for tax purposes still prevail.

Beginning of Austrian Land Taxes

The Austrian land tax is a good example of the European method of assessing land income. It is described in the following article because it is typical and because it represents Austria's great contribution to modern European taxation.[2] The *Censimento Milanese,* which was introduced into the province of Milan (then Austrian) during the second and third quarters of the eighteenth century, was the first of the modern European land taxes. The Austrian

[1] Chambers, C. R., "Relation of Land Income to Land Value," *Bulletin No. 1224,* United States Department of Agriculture, 1924.

[2] Wagner, A., *Finanzwissenschaft,* III. Teil, 2. Aufl. IV. 3. 1:102 (1910).

land tax of 1812, and that of 1869 which is still valid in Austria and the Succession States, are its lineal descendants.[3] The building tax law is also described, though more briefly, because by far the most valuable land in the country — namely, urban land — is taxed under its provisions, and not under those of the land tax law. All land in Austria, unless exempted expressly or by omission,[4] is taxed under one or the other of these two. The land tax will be taken up first.

The land tax of 1869 provided for (1) an accurate survey of all the lands of the Empire, (2) their classification, and (3) their assessment on the basis of the average net income of the lands of each class.

Land Survey

The survey called for by the law of 1869 merely involved the completion of one begun in 1812. Years had been spent in the process and the results are still embodied in the *cadastres* of the various Succession States. The triangulation system of survey was used with triangles of four sizes. The lines used in the largest triangles ran to a maximum of about 20 miles, while in the final network of small triangles, the longest line could not exceed some 2½ miles. In this way a very large number of points were accurately determined and plainly bench-marked.

In each province these fixed points were next referred to a main meridian and a main perpendicular. The ground projection of the tower of the town hall in the provincial capital frequently provided the intersection point for these two lines. Then on a map of appropriate scale the territory of the province was divided up in gridiron fashion into squares of approximately 4½ miles to a side. Each square in turn was subdivided into 20 rectangles. The rectangles received designations relative to their squares, and the squares relative to the main meridian and the main perpendicular.

The area comprised in each rectangle was approximately 720 acres, or a little over a square mile. This area was then mapped out in detail on a scale of 1:288.[5] First of all, the trigonometrically determined bench-marks were entered. Then, relative to these bench-marks, each and every plot of land was entered with exact dimensions, shape, and location. Boundary lines between plots were plainly marked. Exact metes and bounds were thus established. Once made it is comparatively inexpensive and simple to keep such a *cadastral* survey up to date.

Classification and Assessment

The land classification is on the basis of type of cultivation and fertility. There were 8 type classes and, within each of these, 8 fertility classes. In 1896 provision was made for even more than 8 fertility classes, where circumstances seemed to make it desirable. There are thus in general 64 distinguishable classes.

After drawing up these ideal type-fertility classes, figures of average net

[3] Unless otherwise indicated the facts on the pre-war period are from Freiberger, G., *Handbuch der oesterreichischen direkten Steuern,* Vienna, 1899; Steinitzer, E., *Die juengsten Reformen der veranlagten Steuern in Oesterreich,* Leipzig, 1905; or Gruenwald, P., *Die Steuern Oesterreichs im Frieden und im Krieg,* Stuttgart, 1918. The material on the war and the post-war period are from the last-mentioned book and from an unpublished thesis by the author entitled *Direct Taxation in Austria, 1918-1923,* in the Harvard University Library.

[4] See page 223.

[5] For Vienna the scale is 1:720.

income were determined for each class and for each classification district. This work was done by local commissions composed in about equal proportions of state officials, local landowners appointed by the Finance Minister, and others locally elected. The large landowning interests predominated. The local commissions worked out average net income figures for every class of land represented in their districts on the basis of price statistics. These statistics included average prices and average expenses of cultivation of a 10-year period between 1855 and 1869, after excluding the 5 years of highest prices. Average physical output per class, on the basis of the customary methods of cultivation in each locality, were calculated and then reduced to a money figure.

After selecting sample plots which were regarded as truly representative of the average net income figures for each class, the members of the commission broke into small committees of two or three, in order to examine and assign every plot of land in the district to its proper class. The recommendations of the committees were not final until they had been approved first by the local commission as a whole, then by a provincial commission, and finally by a central commission sitting in Vienna. The provincial commissions were to eliminate local inequalities; the central commission, provincial inequalities. Like the local commissions, these appeal commissions were composed of appointed and elected members. After their final approval or modification, as the case might be, the assignment findings were recorded on the *cadastral* maps by a system of coloring and initialing. Thirteen years and about 60 million crowns ($12,000,000) were required to complete this assessment work, despite the fact that the bulk of the surveying had been done earlier.

The following table shows the eight type classes authorized by the law of 1869, the average for all Austria of the *cadastral* net income figures for each class, as determined by the assessment of 1870–83; and in the last column the corresponding figures as corrected by the superficial revision of 1896, which is referred to later:

TABLE I. TYPE CLASSES AND CADASTRAL NET INCOMES FOR EACH CLASS, AUSTRIA, 1883 AND 1897

Type Class	Average Net Income per Joch (1.4 acre) in Crowns (1 Crown = $0.20) 1883	1897
Crop land (Aecker)	11.08	10.14
Meadow (Wiesen)	9.72	9.38
Market garden (Gaerten)	20.16	19.58
Vineyard (Weingaerten)	18.82	15.34
Pasture (Hutweiden)	1.66	1.56
Mountain pasture (Alpen)	0.58	0.48
Forest (Waldungen)	2.46	2.44
Lake, swamp, marsh (Seen, Suempfe, u. Teiche)	4.46	4.72

It is obvious that much land will not come under any one of the eight type classes just enumerated. Such land is either entirely exempt or classed as *Parifikationsland* and taxed as the immediately adjacent agricultural or forest land. Railroad rights of way, quarries, mines, and undeveloped building sites are examples of *Parifikationsland*. Unproductive land, public highways, squares, and burial grounds are examples of exempted land. The area occupied by a building, including the immediately attached courtyard, was exempted from the land tax, but not from the very much higher building tax.

The land tax was apportioned. That is to say, a lump sum was distributed over the provinces and townships according to *cadastral* net incomes, and levied by local assessors (civil service appointees, responsible to the Finance Minister) upon the local landowners in

proportion to the total of the *cadastral* net incomes of their holdings within the tax district. The state tax was fixed and unalterable until the next general revision of the *cadastral* figures. According to the law of 1869, such a revision was to be made in 1896 and every 15 years thereafter. The tax for the first period (1881–96)[6] was fixed at 75 million crowns.

The total *cadastral* annual land income of Austria, according to the assessment of 1870–83, was 329.9 million crowns. The nominal rate of the tax, therefore, was 22.7%. This was the rate of the state tax alone. The additions which the provinces and the townships levied on the same base amounted to about as much again. The total burden, therefore, was about 50% of *cadastral* net income. The real burden, however, was very much less than this, perhaps closer to 15% of real land income.

Before considering the subsequent history of the land tax, a short digression may be in place. It is important to realize that the Austrian *cadastre* is more than a mere tax map. It is a land economic survey. The maps and the accompanying documents reveal a large number of significant physiographic and economic facts. They show not only the metes and bounds of the several parcels of land, but also buildings and other permanent structures, railroads, roads, paths, rivers, brooks, lakes, swamps, character of the soil and subsoil, its ease of cultivation, moisture content, and so forth. The maps, upon which these facts are plainly shown by a system of coloring and numbering, are printed and sold to the general public at very reasonable prices. They are highly important documents of record, which serve a purpose, the importance of which we in this country are just beginning to appreciate. They put a stop to unscrupulous land booming on a large scale such as has too often accompanied American expansion. In fact, land booming has been impossible in Austria practically from the final abolition of serfdom and the establishment of free trade in land.

Michigan has had its share of land boomers, public as well as private, and has finally developed a conscience. The authorities have decided that hereafter, in so far as it lies within their power, no innocent person shall buy sandy cut-over land and break his heart and his purse trying to farm it. In order to stop this social waste, the state has started what Austria started a little over 100 years ago—a land economic survey. Five counties have already been surveyed with a minuteness and thoroughness fully equaling that in the Austrian *cadastre,* and the work continues. The land economic survey, together with land certification and a real estate license law, have put Michigan in a position of leadership in the new movement for a public land policy.

Recent History of the Land Tax

European agriculture suffered severely from declining prices and American competition during the last quarter of the nineteenth century. Austrian agriculture enjoyed no immunity. As a result, the real burden of the land tax tended to increase. As the revision year (1896) approached, therefore, the agrarian interests mobilized their forces to secure tax relief. They succeeded in abundant measure. In the first place, and even in advance of the revision of the figures of the *cadastral* net income,

[6] The figures arrived at in 1881 were regarded as provisional pending the final review, which was completed two years later.

they secured a continuation of the principle of apportionment and a reduction of the state tax by five million crowns. In the second place, they forced the substitution of a superficial re-estimate for the scientific revaluation ordered by the law of 1869. In effect the five million crown reduction in the tax was used to correct a few of the more glaring inequalities which time had revealed. The change in average figures has already been given.[7] The nominal tax rate remained the same since the total *cadastral* net income figures were reduced proportionately—to 307 million crowns.

The third success of the agrarian interests was in connection with the general income tax law which was enacted in this same year, 1896. They secured (1) a reduction of their state land tax payments by 15%,[8] and (2) the adoption of the *cadastral* figures of income as the basis for the assessment of land income. As a result the agrarian interests received a greater reduction in their land tax than they paid in income tax. This was the price of their support of income taxation.

It is necessary to distinguish between the total sum to be raised by the state through the land tax between two revision periods, and the tax assessed to any individual landowner. The latter's assessment could be changed as a result of a number of circumstances. Any such change had to be made good, however, by other taxpayers. For example, a change in the utilization of land, which involved its classification in a lower type class, gave relief from taxation the year following its announcement, verification, and entry on the *cadastral* map. A contrary change, on the other hand, did not bring an increase in the owner's tax until 11 years later. A change upward within a given type class was to be disregarded until the occasion of a general revision.[9] A change in the utilization of forest land could only be made after express permission had been obtained. If the assessors found that such permission had not been secured, the owner could be required to replant the deforested area. Moreover, even though the change had been duly authorized, the 11 years' delay before the imposition of the heavier tax did not apply. Improvements in fertility without changes in the type of cultivation were disregarded until the next general revision.

These provisions afford proof of the great social importance attached to land in Austria. The regulation of forest land, especially, shows us how far we may yet have to go if we are to solve a problem which grows more threatening from year to year.

After the revision of 1896 even the fixity of the state levy became more and more of a fiction. In that year the door, which was already ajar, was opened wide to an abuse that assumed increasing importance with the passing years. This abuse took the shape of abatements or temporary exemptions on account of damages due to acts of God, or to other unavoidable accidents (*Elementarschaeden*). From time to time new causes of damages were added to a list, which came to include such things as hail, floods, fire, insect and animal pests (*Mäusefrass*), phylloxera, wet weather, frost, and spoilage of grain in stacks (*Getreidelagerung*). A landowner affected by any one of these risks could obtain relief proportionate to the

[7] *Supra*, p. 217.

[8] This reduced the state rate effectively to 19.3%. Nominally, however, it remained 22.7% so as not to reduce the base for the local additions.

[9] These last two provisions are reminiscent of certain features of a bill before the Wisconsin legislature (the Grimstad bill). See John R. Commons, "A Progressive Tax on Bare Land Values," *Political Science Quarterly*, Vol. 37, March, 1922.

extent of the damages, which were determined by a formal valuation. Such damages naturally affected whole regions, so that an attempt to recoup the tax remission would have involved increased taxation of other sections and other races. In polyglot Austria, therefore, the easy and the politically expedient thing was simply to let the state take the loss. This was done with the result that the state's revenues from this source declined from 68 million crowns in 1898 to 52.2 million crowns in 1913. The real relief was even greater than these figures would indicate because of the rise in general prices since about 1896 and the high protection which agriculture had enjoyed since 1906.

This generous relief was uncalled for and illogical. It was uncalled for because the figures of average income were based on the results of 10 selected years in a 15-year period, and therefore allowed for a reasonable amount of damage. It was illogical in a system which called for reassessment at infrequent intervals (15 years), because it involved a costly and minute valuation which in itself was probably the equivalent of a real biennial or triennial assessment. Claims for damages were the rule and not the exception.

As a result of this laxity, the land tax not only declined in productiveness but became hopelessly unequal. The many landowners who had modernized their farming methods since 1880, and thus multiplied the productiveness of their lands, paid no more in taxes than those who clung to the antiquated methods current 40 years earlier. This feature of the tax is at once in accord with and in opposition to single tax doctrine. It is in accord in that improvements are exempted; it is in opposition in that any increase in rent, which is due to social causes, escapes entirely.

Individual inequalities developed in time into territorial and racial inequalities, due to the lag of whole sections behind their more progressive neighbors. By 1914 these individual, territorial, and racial inequalities had destroyed the usefulness of the tax as a source of state revenue, though not of local revenue.

But with all its faults the system still possessed some of the qualities of a good tax—namely definiteness, certainty, convenience, and relative economy of collection. These characteristics probably explain the success with which reductions of the state levy were accomplished. There was no opposition from the representatives of the localities, since the provinces and the townships could recoup their losses through higher additions. They did so and thus in fact changed the character of the land tax from a predominantly state to a predominantly local tax. Hence the territorial inequalities just referred to became less important, since they applied only to the diminishing proportion of the state levy.

War and Post-War Developments

The subsequent history of the land tax can be told very briefly. In January, 1914, the tax was changed from an apportioned to a rated tax. The rate was reduced to 19.3%, but the local additions continued to be levied on the old base.[10] The next change did not come until August, 1916, two years after the outbreak of the Great War. At that time the rate was almost doubled, which was little enough in view of the rise in prices since 1896, and especially since 1914. Nevertheless, these increases were regarded as temporary and were

[10] See Footnote 8, p. 219.

accordingly expressed as percentages of the base tax (*Kriegszuschlaege*). Part of the increase—namely, 2% of the base tax—was paid into a special fund which was set aside to defray claims for damages from the so-called acts of God.

No further changes were made until after the war and the break up of the Monarchy. In February, 1919, the special surtax to defray claims for damages from the elements was absorbed into the normal rate, which was increased to 25% at that time. More important, however, was the attempt to adapt this objective type of tax, based on assessment *in rem* rather than *in personam* into a subjective tax capable of discriminating between large and small holdings. This was done by the simple device of making the extraordinary state surtax to the base tax progressive. Accordingly the rate of the surtax was stepped up from 80% to 150% according to the *cadastral* net income from a person's total holdings within the comparatively small *Steueramtsbezirk*.[11]

In 1920 the normal rate was advanced to 40%, and the existing surtaxes were imposed on this larger base. It must not be forgotten, however, that the tax object itself remained the *cadastral* net incomes established in 1896. Indeed it was not until the fall of 1921, after the cost-of-living index number registered a rise in prices over 1914 of some three hundred fold, that these *cadastral* figures were changed. The increases even then were very nominal. Their chief significance lies in the further indication they give of a growing hostility to the big landowners, whose holdings in present Austria are overwhelmingly in forest.[12] The *cadastral* figures for forest land were increased forty fold as against thirty fold for vineyard and garden, and only twenty fold for all other classes. In the same spirit the progressive surtaxes were applied to total holdings within the much larger *politischer Bezirk*.

These changes did not exercise any great influence at the time, because the land tax had been reduced to the vanishing point by the currency depreciation. This statement holds despite the fact that the provincial additions alone, not to mention those of the townships, ranged from 100% to 800% in 1921, depending on the province. The change revealed a spirit, however, which may ultimately prove inimical to wise forest utilization. Unless the old income relationship was unnecessarily favorable to forest land (see Table I) it can hardly be doubted that the doubling of its assumed income, relative to crop land and meadow, when coupled with the progressive surtaxes, would discourage large holdings. It is doubtful whether small forest holdings are favorable to economical utilization, even though strict regulations prevent deforestation. If such a policy is persisted in, therefore, the state and the municipalities may be obliged to extend their holdings. If the strict regulations against deforestation were in any way relaxed, on the other hand, there would be grave danger of forest devastation as a result of this tax policy.

These speculations cannot be verified for two reasons. In the first place the

[11] This departure is based on the same principle as that underlying the Grimstad bill; namely, a surtax on the privilege of holding much land. See Footnote 9, p. 219.

[12] 6.1% of agricultural land is in holdings of more than 250 acres, while 47% of forest land is in large holdings of more than 1,250 acres. Austria has 7.5 million acres or about 38% of its surface in forest. Of the 3.5 million acres in large holdings, 28% are government property, 20% municipal property, and the rest private property. Hudeczek, K., *The Economic Resources of Austria* (Vienna, 1922), pp. 10, 15.

changes occurred too recently to permit their effects to be seen. In the second place they were too short-lived. In 1922 the land tax was assigned entirely to the localities (this was little more than the recognition of the existing situation) and considerable local option was granted to these bodies. They are at liberty to retain the tax unchanged, to reclassify lands, to convert the tax into one on capital value or on real land income, subject always to raising a certain minimum from this source. The writer is not aware whether the localities have availed themselves of their new freedom. It is reasonable to suppose, however, that they will continue the policy of discrimination against large holdings, since their representatives in the National Council were responsible for the introduction of the policy. If they do, the discrimination will become more marked, since heretofore the progressive surtaxes applied only to the relatively unimportant state levy. This situation will repay study.

The Building Tax

The Austrian building tax has had a long and interesting history.[13] It can be dealt with briefly, however, in an account of land taxation. As has been stated earlier, practically nothing but the standing room for buildings is taxed under the building tax. The tax consists of two parts, (1) a classified house tax, and (2) a rented buildings tax.

The classified house tax is levied on *homes* only in country districts and in smaller towns where home ownership predominates. It is assessed according to the number of rooms and is payable together with the land tax. Unlike the land *cadastre,* however, the house *cadastre* is kept up to date. The rate is very low, constituting in effect merely a slight surtax to the land tax. In 1913, for example, it yielded to the state only 10.6 million crowns, as compared with 52.2 millions from the land tax. It was subject, however, to local additions which averaged about 150% of the state tax in 1913.

The rate of the rented buildings tax, on the other hand, was oppressively high for many years before the war. It was assessed biennially on gross rentals less a flat percentage reduction for expenses and amortization. This allowance amounted to 15% in the larger cities, and to 30% (33⅓% in Dalmatia) in other places. The state rate varied according to the size of the place. In the larger cities it was 26⅔%; in other places 20%. The local additions raised the rate in Vienna, for example, to about 50%. This high rate discouraged building and was undoubtedly responsible in part for the congested and unsanitary dwellings of the poor.[14]

The tax was so productive, however —it yielded 116.9 million crowns in 1913 to the state, or one-quarter of the revenues from direct taxation—that it proved impossible to secure any adequate revision prior to the war. The state contented itself with palliatives. At an early date temporary complete exemption was granted to new homes which satisfied certain sanitary and financial regulations, and which were intended for members of the laboring and lower middle classes. By 1867, however, these exemptions had assumed such large proportions that a 5% tax on net rentals, as defined above, was substituted for complete exemption. In 1912 the state agreed to reduce its rate

[13] See references cited, p. 216.

[14] See the comparative statistics for Breslau and Prague in Dr. W. Mildschuh's "Mietzinse und Bodenwerte in Prag in den Jahren 1869-1902," *Wiener Staatswissenschaftliche Studien,* 9. Band. I. Heft. Wien, 1908.

by the amount by which the local additions should exceed the height they had reached in 1911. Thus, by 1914, this tax, like the land tax, had passed the dividing line and had become primarily a local tax assessed and collected by central authority. In 1922 both the classified house tax and the rented buildings tax, simultaneously with the land tax, were turned over to the localities.

Before describing the subsequent fate of the building tax, one strange anomaly in the combined land and building taxes should be mentioned. The classified house tax applied only to *homes* occupied by their owners and situated in rural districts. The tax on rented buildings applied to homes and to business and manufacturing premises alike, if rented, or if located in towns where renting predominated. In such towns, therefore, the rental value of places of business occupied by their owners could be determined by comparison. Places of business occupied by their owners, however, and located in small towns where home ownership predominated, were exempt from both taxes, and the building site itself was not liable to the land tax. The result, of course, was that a business had only to move out of the cities and larger towns in order to enjoy complete exemption from the so-called real taxes on land and buildings. The slight urban development of old Austria, and the surprising survival of primitive handicraft industries in the country districts,[15] tempts one to seek the explanation, in part at least, in this strange hiatus in the tax legislation.

The Fate of the Building Tax

Between 1912 and 1922 there was no formal change in the building tax. Inflation and a ruthless rent control law, however, effectually destroyed private property rights in leased urban real estate. Henry George's ideal was realized, though in a very different way from that proposed in *Progress and Poverty*. The empty shell of private property was left, but the substance was destroyed and has not been restored to date. The unfortunate real estate owner may assess his tenants for the maintenance of his building, but he may still demand in paper crowns as net rent, after paying taxes, exactly what he received in gold crowns, after paying taxes, before the war. Meantime the paper crown is worth only one fourteen-thousandth of the value of the old gold crown.

The problem of restoring private property rights has been tremendously complicated, in Vienna at least, by municipal action. After depreciation had reduced rentals to a nominal amount the municipal authorities introduced a special graduated tax on tenants. From time to time the tax has been increased, so that today the city of Vienna has effectually substituted itself as the real beneficiary of these properties. The old owners have been reduced to the recipients of nominal quit rents. The sums raised from this tax on tenants are used in part to build municipal tenements on the outskirts of the city, which are said to be rather unique in design. They are planned for families in which both husband and wife work out. Each tenement has its playground and its children's caretaker. The municipal authorities are convinced Marxian socialists and are frankly trying to make Vienna a model socialist city. They will, therefore, resist to the last ditch all attempts to restore private property in Vienna real estate.

[15] See Herz, F. *Die Produktionsgrundlagen der oesterreichischen Industrie vor und nach dem Krieg*, Wien-Berlin, 1917.

Rent control, naturally, could not stand by itself. It had to be followed by housing control. This control was necessary because, as rentals declined, many working-class families tried to get rid of the subtenants whom they had been forced to take in during the period of high rentals. But there was no place for these subtenants to go, since there had been no new construction since 1914. Accordingly a house control law was passed to regulate the amount of space an individual might occupy. The city was then combed to discover homes in which congestion was less than the legal limit of tolerance. Every tenant was required to announce the number of inmates of his apartment. Landlords were required to confirm these declarations. The result is that today freedom of movement within the city has virtually ceased. A person seeking living quarters must secure municipal approval. A young couple who desire to marry and who are without money or political influence may wait years for as little as a room and kitchenette. The establishment of new industries is rendered very difficult because of dependence on the labor supply of the immediate neighborhood.

Henry George claimed that the state could take the income from land without taking the title or affecting the utilization. His critics have claimed that the confiscation of the income would inevitably involve state tenancy and state control. At first blush Vienna's experience would seem to bear out the claim of George's critics. It must be remembered, however, that the municipality has gone further than Henry George would have gone. It has taken not only the income from the land but also the income from the capital invested on the land. The experiment, therefore, is not conclusive one way or the other.

Increment Taxes

In conclusion a word may be said about increment taxes in Austria. Prior to the war the state had adopted no such measure, despite the action of England and especially of Germany, whose influence has always been great on Austrian financial legislation. In 1920, however, the principle was incorporated into the general income tax law, as part of a scheme for taxing capital gains generally. Heretofore profits from sales of property had only been reckoned as income if the sale was part of the regular business of the taxpayer (stock broker, real estate operator), or if all the accompanying circumstances showed that the purpose of the acquisition was purely speculative. Henceforth all such gains are expressly liable regardless of the speculative factor. Where, however, the sale is clearly non-speculative in character, the difference between purchase price and selling price is added to ordinary income at one-fifth of its value, or, if the property disposed of has been in a person's possession less than five years, the difference is added to ordinary income at its value divided by the number of years during which the property has been possessed.

In the United States this principle of taxing capital gains was adopted under the income tax in 1913. In 1916 Prussia broadened its definition of income for the income tax by including the profits from property sales. The German federal income tax law of 1920 taxes profits from real estate sales as income if speculative intent is clear or if the property was bought since August 1, 1914.[16]

Just before the war Germany repealed its complicated land value incre-

[16] von Eheberg, K. T., *Finanzwissenschaft*, pp. 301, 304-7. Leipzig, 1921.

ment tax on the occasion of passing a law to tax all capital gains.[17] In 1920 this law was still on the statute books, although depreciation had made it impossible of execution. The tendency thus is plainly to abandon special increment taxes in favor of taxing all capital gains through the income tax. There is small likelihood, therefore, that we in the United States will experiment with special land increment taxes of either the English or German pre-war types. With our general property tax, which taxes increments in value before they are realized, and our federal income tax, which taxes capital gains, we are undoubtedly reaching the social element in land income in ample measure.

[17] *Ibid.*, p. 374.

GROWTH OF URBAN POPULATION IN THE UNITED STATES

By ROSALIND TOUGH

TODAY more than 50% of our people live in cities having a population of 2,500 or more. We have become a nation with approximately 2,800 urban centers, areas of activity employing and housing a little more than half of the people of the nation.

This change in the distribution of our population is not a sudden phenomenon, a condition to be attributed to some peculiar complex of the popular mind within the past 10 years. In each of the last 4 decades a smaller proportion of the population is found in rural districts, and a larger proportion in urban areas, the proportion increasing at the rate of 5% of the total population each decade. The period from 1910 to 1920 is peculiarly significant, for in this decade we passed the 50% point of urbanization, while our total population reached and passed the 100 million mark by almost 6 million people. (Table I.)

It is evident to any one who has observed population phenomena that neither population increase nor urban increase occurs uniformly in all sections of a nation. It is of interest, therefore, to note where the population increase occurred in the United States, and how closely the urban population increase correlated with the increase in total population.

I. Urbanization by Geographic Areas

The United States is commonly divided into nine [1] geographic divisions. In order to have a familiar basis of differentiation between one section of the country and another, and in order to compare and contrast population phenomena, these more or less arbitrary divisions will be used. (Table II.)

Between the 1910 and 1920 census reports the total population increase was 13,738,354. The East North Central and Middle Atlantic geographic divisions of the United States together had somewhat less than half (44.9%) of this total increase.

This percentage is apt to give a somewhat erroneous impression unless the fact is emphasized that these two areas had about 55% of the total population in 1910, and therefore would, under ordinary conditions, have a large proportion of the total population increase. For the country as a whole the total increase in population represented a percentage increase over the 1910 population of 14.9%. For the East North Central division this increase was 17.7% and for the Middle Atlantic section

[1] According to the 1920 Census, these divisions are: *New England,* the six New England states; *Middle Atlantic,* New York, Pennsylvania, and New Jersey; *East North Central,* Ohio, Indiana, Illinois, Michigan, and Wisconsin; *West North Central,* Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas; *South Atlantic,* Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida; *East South Central,* Kentucky, Tennessee, Alabama, and Mississippi; *West South Central,* Arkansas, Louisiana, Oklahoma, and Texas; *Mountain,* Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada; *Pacific,* Washington, Oregon, and California.

TABLE I. INCREASE IN POPULATION AND PROPORTION OF TOTAL POPULATION IN PLACES OF 2,500 INHABITANTS OR MORE, 1890-1920*

Census Year	Total Population	Places of 2,500 or More		
		Population	Number of Places	Percentage of Total
1920	105,710,620	54,304,603	2,787	51.4
1910	91,972,266	42,166,120	2,313	45.8
1900	75,994,575	30,380,433	1,801	40.0
1890	62,947,714	22,298,359	1,417	35.4

* *United States Census*, Vol. I, 1920.

15.2%. Thus though the increase in population for these two areas represented 44.9% of the total increase for the United States as a whole, relatively their increase on their respective bases was only a little above the average for the entire country.

In contrast to the two sections just discussed, the Mountain division had only about 1/20 of the total population increase (5.1%). This, however, represented a relative increase of 26.7% over the 1910 population in that area.

A somewhat similar conclusion may be drawn with respect to the Pacific division, which had only 10% of the total increase of population of the United States, but actually increased on the basis of its 1910 population 32.8%.

From the point of view of urbanization, the total increase of population is of less significance than such questions: Did urban or rural communities benefit to the greater extent by the increase? In what regions of the United States did most of the urban increase occur? What class of cities and which individual cities grew fastest during the 10-year period?

Urbanized Geographic Areas

In 1910 the New England, the Middle Atlantic, the East North Central, and the Pacific divisions of the United States were the only geographic areas having more than half of their population in urban communities.[2] (Table IIIA.) At that time only 45.8% of the total population lived in cities.

TABLE II. THE PERCENTAGE OF INCREASE IN POPULATION IN EACH GEOGRAPHIC DIVISION AND THE PROPORTION OF INCREASE IN EACH GEOGRAPHIC DIVISION TO THE TOTAL INCREASE IN POPULATION OF THE UNITED STATES, 1910-1920*

Geographic Division	1920 Population	1910 Population	Increase	Percentage Increase	Percentage of Total Increase
United States	105,710,620	91,972,266	13,738,354	14.9	100.0
New England	7,400,909	6,552,681	848,228	12.9	6.2
Middle Atlantic	22,261,144	19,315,892	2,945,252	15.2	21.4
East North Central	21,475,543	18,250,621	3,224,922	17.7	23.5
West North Central	12,544,249	11,637,921	906,328	7.9	6.6
South Atlantic	13,990,272	12,194,895	1,795,377	14.7	13.1
East South Central	8,893,307	8,409,901	483,406	5.7	3.5
West South Central	10,242,224	8,784,534	1,457,690	16.6	10.6
Mountain	3,336,101	2,633,517	702,584	26.7	5.1
Pacific	5,566,871	4,192,304	1,374,567	32.8	10.0

* *United States Census*, Vol. I, 1920.

TABLE IIIA. URBAN AND RURAL POPULATION BY GEOGRAPHIC DIVISIONS, 1910.*

Geographic Division	1910				
	Total Population	Urban Population	Rural Population	Percentage Urban	Percentage Rural
United States	91,972,266	42,166,120	49,806,146	45.8	54.2
New England	6,552,681	4,998,082	1,554,599	76.3	23.7
Middle Atlantic	19,315,892	13,723,373	5,592,519	71.0	29.0
East North Central	18,250,621	9,617,271	8,633,350	52.7	47.3
West North Central	11,637,921	3,873,716	7,764,205	33.3	66.7
South Atlantic	12,194,895	3,092,153	9,102,742	25.4	74.6
East South Central	8,409,901	1,574,229	6,835,672	18.7	81.3
West South Central	8,784,534	1,957,456	6,827,078	22.3	77.7
Mountain	2,633,517	947,511	1,686,006	36.0	64.0
Pacific	4,192,304	2,382,329	1,809,975	56.8	43.2

* *United States Census*, Vol. I, 1920.

One might expect that more geographic areas would be urbanized in 1920 when more than half of the population lived in urban centers, but this is not the case. To be sure each geographic division could boast in 1920 of more "city folk" than in 1910, and as a consequence the percentage of rural population declined generally. Yet despite this general urban increase, actually the same four geographic divisions as in 1910 had over half their respective populations living in cities. Thus the other five divisions still are predominantly rural districts. (Table IIIB.)

Of the four geographic divisions which were over 50% urbanized the Middle Atlantic and East North Central divisions together in 1910 had 55.3% of the total urban population, while in 1920 this percentage had decreased to 54.7. (Table IV.) These facts clearly point out the location of the great urban centers of the United States —in the belt of states extending westward from New York to Illinois.

In numbers the urban growth of the United States between 1910 and 1920 exceeded 12 million people. About one-half of this, approximately 6⅓ million, was found in the two divisions just mentioned (Middle Atlantic and East North Central). (Table V.)

It is not wholly accurate, however, to emphasize merely the increase in numbers. These areas, as has been pointed out, had in 1910 over half of the urban

[2] An urban center is defined by the *United States Census* as a community of 2,500 population or over, and for this discussion will be considered as such.

TABLE IIIB. URBAN AND RURAL POPULATION BY GEOGRAPHIC DIVISIONS, 1920.*

Geographic Division	1920				
	Total Population	Urban Population	Rural Population	Percentage Urban	Percentage Rural
United States	105,710,620	54,304,603	51,406,017	51.4	48.6
New England	7,400,909	5,865,073	1,535,836	79.2	20.8
Middle Atlantic	22,261,144	16,672,595	5,588,549	74.9	25.1
East North Central	21,475,543	13,049,272	8,426,271	60.8	39.2
West North Central	12,544,249	4,727,372	7,816,877	37.7	62.3
South Atlantic	13,990,272	4,338,792	9,651,480	31.0	69.0
East South Central	8,893,307	1,994,207	6,899,100	22.4	77.6
West South Central	10,242,224	2,970,829	7,271,395	29.0	71.0
Mountain	3,336,101	1,214,980	2,121,121	36.4	63.6
Pacific	5,566,871	3,471,483	2,095,388	62.4	37.6

* *United States Census*, Vol. I, 1920.

population, so that it might be expected that they would have the largest proportion of the urban increase. But their 1920 populations, compared with those of 1910, represent a percentage increase of 35.7% for the East North Central division and 21.5% for the Middle Atlantic section. Thus in the former case the urban population increased by one-third and in the latter case by only one-fifth, showing the westward movement of the center of population. The urban population for the United States in 1920 compared with that of 1910 represented an increase of 28.8%. Hence, although the East North Central and Middle Atlantic divisions had more than half of the total increase, their relative increases, compared with the increase for the United States as a whole, were, in both cases, not far from normal.

In contrast to the two areas just mentioned the West South Central division increased its urban population 50% between 1910 and 1920, and yet this increase represented only 8% of the total increase in urban population for the United States.

II. Growth of Cities

As the different geographic areas of the United States shared unequally in the distribution of increase in population, so the different cities within the geographic areas shared unequally. The *United States Census Reports* for both 1910 and 1920 classify cities on the basis of their population into eight groups. (Table VI.) Difficulties arise, however, in comparing these two census classifications, owing especially to the fact that cities do not remain for any length of time within one group. To illustrate, in 1910 there were 367 cities within the classification from 10,000 to 25,000 inhabitants. In 1920 there were 459 in this group. This, however, did not include the original 367 cities plus an addition of 92 cities which within the 10-year period had reached the 10,000 population mark. By 1920 many of the original 367 cities had increased in population so rapidly that they were included in higher classifications. On the other hand, a few of the cities had decreased in population and had fallen into the group below 10,000 in population. The 1920 total of 459 thus included some of the original cities of 1910 plus a large number of new cities—cities which during the decade had decreased in population and therefore had come into this classification from higher groups, and cities which had increased in population during the period and had therefore become eligible to this group of cities.

This phenomenon of city populations increasing in some instances and decreasing in others makes the cities included within each classification somewhat different from one decade to the next. Thus, in comparing the 1910 with the 1920 classifications of cities as given in the census, accurate conclusions cannot be reached because of the fact that the bases have changed. In order to avoid this difficulty, the population for 1920 of cities as given in the 1910 classification was found, and thus the same base for both periods maintained. (Table VI.)

In all classes of cities for 1910 (2,313 with a population of more than 2,500) there were a little more than 42 million people. The population of these same cities by 1920 had increased to approximately 52½ million, or an absolute increase in population of about 10⅓ million. The cities with a population of a million or more—New York, Chicago, and Philadelphia—had 16%

TABLE IV. COMPARISON OF THE PERCENTAGE OF URBAN POPULATION IN EACH GEOGRAPHIC DIVISION, 1910-1920*

Geographic Division	1920		1910	
	Urban Population	Percentage of Total	Urban Population	Percentage of Total
United States	54,304,603	100.0	42,166,120	100.0
New England	5,865,073	10.8	4,998,082	11.9
Middle Atlantic	16,672,595	30.7	13,723,373	32.5
East North Central	13,049,272	24.0	9,617,271	22.8
West North Central	4,727,372	8.7	3,873,716	9.2
South Atlantic	4,338,792	8.0	3,092,153	7.3
East South Central	1,994,207	3.7	1,574,229	3.7
West South Central	2,970,829	5.8	1,957,456	4.6
Mountain	1,214,980	2.2	947,511	2.2
Pacific	3,471,483	6.4	2,382,329	5.6

* *United States Census*, Vol. I, 1920.

of the total increase of urban population; whereas the group of cities with less than 10,000 inhabitants (1,718 cities), had almost 17% of the total increase, or, in other words, an increase in the number of people about equal to that of the three largest cities.

The group of cities having the smallest portion of the population increase were those within the classification of cities from 500,000 to a million. This may be accounted for, however, by the fact that these cities had only a small part of the total urban population in 1910 (7%) and would therefore not be expected to increase as rapidly as some of the larger groups. In contrast the three largest cities which had 16% of the total increase had in 1910 about one-fifth of the total urban population, so that the increase here is not as phenomenal as it at first appears.

It has already been shown that the population of the 2,313 cities in the United States in 1910 (approximately 42 million) had increased to almost 52½ million by 1920. The total urban population of the United States in 1920,

TABLE V. THE PERCENTAGE OF INCREASE IN URBAN POPULATION IN EACH GEOGRAPHIC DIVISION AND THE PROPORTION OF INCREASE IN EACH GEOGRAPHIC DIVISION TO THE TOTAL INCREASE IN URBAN POPULATION OF THE UNITED STATES, 1910-1920*

Geographic Division	1920 Urban Population	1910 Urban Population	Increase	Percentage Increase	Percentage of Total Increase
United States	54,304,603	42,166,120	12,138,483	28.8	100.0
New England	5,865,073	4,998,082	866,991	17.3	7.1
Middle Atlantic	16,672,595	13,723,373	2,949,222	21.5	24.3
East North Central	13,049,272	9,617,271	3,432,001	35.7	28.3
West North Central	4,727,372	3,873,716	853,656	22.0	7.0
South Atlantic	4,338,792	3,092,153	1,246,639	40.3	10.3
East South Central	1,994,207	1,574,229	419,978	26.7	3.5
West South Central	2,970,829	1,957,456	1,013,373	51.8	8.3
Mountain	1,214,980	947,511	267,469	28.2	2.2
Pacific	3,471,483	2,382,329	1,089,154	45.7	9.0

* *United States Census*, Vol. I, 1920.

TABLE VI. COMPARISON OF THE PROPORTION OF INCREASE IN POPULATION FOR EACH CLASS OF CITY WITH THE TOTAL INCREASE FOR ALL CLASSES OF CITIES, 1910-1920*

Class of City Population Basis	Cities	1920 Population	1910 Population	Absolute Increase	Percentage of Total Increase
All Classes	2,313	52,474,280	42,166,120	10,308,160	100.0
1,000,000 or More	3	10,145,532	8,501,174	1,644,358	16.0
500,000 to 1,000,000	5	3,640,967	3,010,667	630,300	6.1
250,000 to 500,000	11	5,360,195	3,949,839	1,410,356	13.7
100,000 to 250,000	31	5,973,601	4,840,458	1,133,143	11.0
50,000 to 100,000	59	5,488,276	4,178,915	1,309,361	12.7
25,000 to 50,000	119	5,131,647	4,026,045	1,105,602	10.7
10,000 to 25,000†	367	6,877,547	5,524,434	1,353,113	13.1
Less than 10,000‡	1,718	9,856,515	8,134,588	1,721,927	16.7

* This classification is based on the *United States Census*, Vol. I, 1920. The data for 1920 include only the population of the cities comprised in the 1910 classification.

† In 1910 there were 367 cities in this classification. By 1920 six of these cities had been annexed to others and their population in the 1920 census included in that of the larger city—so that their population could not be included in the 1920 total for this group.

‡ In 1910 there were 1,718 cities in this group. Twenty-two of these cities had either been annexed to others, or their population unaccounted for in 1920, so that they could not be included in the 1920 total for the group.

however, was about 54⅓ million. (Table VII.) The difference, about 1⅔ million, is explained by the increase in the number of communities classed as cities during the period. In 1910 there were 2,313 urban centers; by 1920 this number had increased to 2,787. In 1920 then the United States had an actual increase of 474 cities, bringing an increase in urban population of 1,830,323 people.

Changing Rank of the 25 Largest Cities

The three largest cities of the United States—New York, Chicago, and Philadelphia—have ranked first, second, and third in population respectively since 1890. In 1880 Philadelphia had a greater population than Chicago, and therefore ranked second in the list of cities. Within a period of 40 years Detroit has risen from seventeenth place in rank to fourth, and in the period, 1910-1920, doubled its population. Los Angeles too has had a rapid growth, ranking one hundred and thirty-fifth in 1880, fifty-seventh in 1890, and tenth by 1920. (Table VIII.)

TABLE VII. COMPARISON OF THE PROPORTION OF POPULATION IN EACH CLASS OF CITY WITH THE TOTAL POPULATION FOR ALL CLASSES, 1910-1920*

Class of City Population Basis	1920			1910		
	Number of Cities	Population	Percentage of Total	Number of Cities	Population	Percentage of Total
All Classes	2,787	54,304,603	100.0	2,313	42,166,120	100.0
1,000,000 or more	3	10,145,532	18.7	3	8,501,174	20.2
500,000 to 1,000,000	9	6,223,769	11.5	5	3,010,667	7.1
250,000 to 500,000	13	4,540,838	8.4	11	3,949,839	9.4
100,000 to 250,000	43	6,519,187	12.0	31	4,840,458	11.5
50,000 to 100,000	76	5,265,747	9.7	59	4,178,915	9.9
25,000 to 50,000	143	5,075,041	9.3	119	4,026,045	9.5
10,000 to 25,000	459	6,942,742	12.8	367	5,524,434	13.1
Less than 10,000	2,041	9,591,747	17.7	1,718	8,134,588	19.3

* Compiled from the *United States Census*, Vol. I, 1920.

TABLE VIII. RANK OF CITIES HAVING, IN 1920, 250,000 INHABITANTS OR MORE, 1880-1920*

City	1920	1910	1900	1890†	1880
New York	1	1	1	1	1
Chicago	2	2	2	2	3
Philadelphia	3	3	3	3	2
Detroit	4	9	13	15	17
Cleveland	5	6	7	10	11
St. Louis	6	4	4	5	5
Boston	7	5	5	6	4
Baltimore	8	7	6	7	6
Pittsburgh	9	8	11	13	12
Los Angeles	10	17	36	57	135
Buffalo	11	10	8	11	13
San Francisco	12	11	9	8	8
Milwaukee	13	12	14	16	18
Washington	14	16	15	14	10
Newark	15	14	16	17	14
Cincinnati	16	13	10	9	7
New Orleans	17	15	12	12	9
Minneapolis	18	18	19	18	37
Kansas City, Mo.	19	20	22	24	29
Seattle	20	21	48	70	151
Indianapolis	21	22	21	27	23
Jersey City	22	19	17	19	16
Rochester	23	25	24	22	21
Portland	24	28	42	61	106
Denver	25	27	25	26	49

* *United States Census*, Vol. I, 1920, and Vol. I, 1910.

† Brooklyn, New York, now included within the political boundaries of New York, ranked fourth among the principal cities of 1890.

It is interesting to note that in 1890 none of the cities listed seems to have held fourth place. The city which ranked fourth in population at that date was Brooklyn, New York, which since that time has come within the political boundaries of the city of New York.

Factors in the Growth of Cities

If a city doubles its population in a decade or even increases by half, we consider its growth exceptional. Between 1910 and 1920, however, 63 cities having a population in 1920 of 25,000 or more increased a little over 50%, while 25 of them more than doubled their population (Table IX).

The greatest population increase occurred in Hamtramck Village and Highland Park, both of them increasing more than 1,000% (Table X). These cities, although completely surrounded by the city of Detroit, maintain their political entity, so that their growth is listed separately from that of the larger city.

Detroit, however, increased in population a little over 100% during the decade, 1910-1920. Detroit's citizens attribute this growth to the fact that their city and the two municipalities mentioned above rank among the foremost centers of automobile manufacture in the world, and of course this industry has had an amazing development in this 10-year period.

Akron, Ohio, the center of the rubber industry, owes much of its growth also to the increase in the number of automobiles manufactured between 1910 and 1920, because with every car produced a large amount of rubber is used, and hence a rapid growth in the demand for rubber products occurred.

As in the cases of Detroit and Akron, the greater number of these 25 cities which more than doubled in population owe their rapid increases to industrial development. In order to attract industries, however, a city usually has some peculiar advantages such as proximity to natural resources, or an advantageous

TABLE IX. NUMBER OF CITIES HAVING, IN 1920, 25,000 INHABITANTS OR MORE, GROUPED ACCORDING TO RATE OF INCREASE *

Rate of Increase	Number of Cities
100% or over	25 †
70-100%	19
50- 70%	19
30- 50%	70
20- 30%	56
10- 20%	53
Under 10%	38
Cities Increasing During Decade, 1910-1920	280
Cities Decreasing During Decade, 1910-1920	7
Total	287

* *United States Census*, Vol. I, 1920.

† Includes Clifton, N. J., incorporated since 1910 from rural territory. These 25 cities also include Norwalk, Connecticut, whose nominal increase was due mainly to an annexation of territory, and Bethlehem, Pennsylvania, whose nominal increase resulted principally from a consolidation with South Bethlehem.

situation with respect to raw material. For example, Tulsa, Oklahoma, which increased in population almost 300% in the 10-year period, attributes its growth to proximity to natural resources—oil, coal, and gas. Clarksburg, West Virginia, which doubled its population between 1910 and 1920, owes its growth to these natural resources. Especially because of a supply of gas at low cost, there has been a rapid development of the glass industry in the latter city.

Winston-Salem, North Carolina, on the other hand, attributes its growth not so much to its power resources as to the fact that it is situated in the heart of the tobacco region and on the northern edge of the cotton belt. Furthermore, it is close enough to the mountains to obtain timber cheaply. As a result of this advantageous location, it has become an important center for the manufacture of cotton, tobacco, and wood products.

Industry is not the sole reason for the rapid growth of cities, although, as has been pointed out, the most rapid increases are usually attributable to this cause. Separate political entities, which are really suburbs of a large city serving as residential sections, often show rapid increases in population. Oak Park village, Illinois, a suburb of Chicago, is an example of this type of city.

Usually when we think of city growth, we attribute it to some peculiar advantage such as those that have just been discussed. However, a city may materially increase its population by merely expanding its boundaries. This was the case with the cities of Norwalk, Connecticut, and Bethlehem, Pennsylvania (Table IX). Norwalk consolidated with South Norwalk, resulting in 299% increase of population attributed to the city of Norwalk. Bethlehem and South Bethlehem consolidated and incorporated as Bethlehem, increasing the population of Bethlehem approximately 290%.

Knoxville, Tennessee, had a somewhat similar experience. Because of political reasons, for many years the city was prevented from expanding its boundaries, and when the restrictions were broken, naturally large groups of people were added to the city's population, so that within the 10-year period the city increased in population 114%.

Distribution of Growth within Metropolitan Areas

Thus far in discussing city growth the political city has been considered as a unit, when actually the real unit consists of the city itself and the surrounding territory. These two areas together are called a "metropolitan district."[3]

The *United States Census* lists 29 metropolitan districts. These, however, include 32 cities, because of the fact that certain large cities are close enough together to be included in the one metropolitan area. These cities are San Francisco and Oakland, Minneapolis and St. Paul, and Kansas City, Missouri, and Kansas City, Kansas. (Table XI.)

In 1910 the 32 central cities had about 77% of the total population of

[3] The *United States Census* states: "The metropolitan district which has as its nucleus a city having at least 200,000 inhabitants, comprises the population and area of the central city itself and of those minor civil divisions lying within the adjacent territory which at the last census had 150 or more inhabitants per square mile. Where the density of population was less than this the division was considered rural rather than urban in character and as not properly a part of the metropolitan district. The limit of density, however, was not always rigidly applied; in a few instances a minor civil division having a density of less than 150 per square mile has been included, because it was nearly or completely surrounded by other divisions the density of which would require their inclusion." Vol. I, p. 62.

the metropolitan districts. It is to be expected, then, that in these central cities most of the population increase would occur. The distribution of the increase from 1910 to 1920 shows exactly this result, the central cities in 1920 having approximately 72% of the total increase. However, when the populations of the central cities for 1920 and 1910 are compared, the figure for 1920 shows an increase of about 25% over the population of 1910. For the area outside the central cities the population in 1920 shows an increase of approximately 33% over that of 1910. Hence, for the 29 metropolitan districts, there was a greater relative increase outside the central cities than within the cities themselves. This may be explained, in part at least, by the rapid growth of the suburbs of the larger cities.

For further analysis the metropolitan districts were divided into two parts: those including cities having 500,000 inhabitants or over in 1920 (13 districts), and those including cities having a population of 200,000 to 500,000 in 1920 (16 districts). (Tables XII and XIII.)

The general conclusions for the whole number of metropolitan districts apply to the group of districts containing the 13 larger cities. However, the group of districts comprising the smaller cities shows somewhat different tendencies. Cities of from 200,000 to 500,000 inhabitants had within the central cities a much larger proportion of the population increase of their districts (approximately 83%) than the cities above 500,000 in population or the cities of the metropolitan districts in general. Furthermore, the 1920 population of the smaller central cities showed an increase of about 27% over that of 1910, and the population of the area outside the central cities increased slightly less. Thus in the districts in which cities from 200,000 to 500,000 were located, the relative growth of the central cities and of the suburban territory was approximately the same, although the central cities themselves had over 80% of the total population increase.

TABLE X. CITIES HAVING 25,000 INHABITANTS OR MORE IN 1920 WHICH INCREASED IN POPULATION MORE THAN 100% BETWEEN 1910 AND 1920 *

Rank	City (unless otherwise specified)	Percentage of Increase
1	Hamtramck Village, Michigan	1,266.0
2	Highland Park, Michigan	1,028.6
3	Miami, Florida	440.5
4	Wichita Falls, Texas	388.8
5	Tulsa, Oklahoma	296.4
6	Gary, Indiana	229.6
7	Long Beach, California	212.2
8	Cicero, town, Illinois	209.1
9	Clarksburg, West Virginia	202.9
10	Akron, Ohio	201.8
11	East Cleveland, Ohio	197.3
12	Lakewood, Ohio	174.9
13	Phoenix, Arizona	160.9
14	Warren, Ohio	144.1
15	Flint, Michigan	137.6
16	Pontiac, Michigan	135.8
17	Clifton, New Jersey	123.0
18	West New York, town, New Jersey	120.7
19	Irvington, town, New Jersey	114.5
20	Knoxville, Tennessee	114.1
21	Detroit, Michigan	113.3
22	Winston-Salem, North Carolina	113.2
23	Oak Park, village, Illinois	105.0

* *United States Census*, Vol. I, 1920.

III. Trends of Urbanization

We have seen how gradually and steadily a majority of the population of the United States has congregated in urban centers. We have seen, too, that most of these urban centers have sprung up in the four geographic divisions which are popularly called the "industrial area" of the country, and in addition, that the growth of urbanization in this area has pushed westward with a relatively declining tendency in the urban significance of New England states. It is worthy of note also that as large a proportion of the urban population lives in small communities, perhaps

TABLE XI. INCREASE IN POPULATION OF METROPOLITAN DISTRICTS* OF THE UNITED STATES, 1910-1920†

District	Population		Absolute Increase	Percentage Increase	Percentage of Total Increase
	1920	1910			
Total (29 Metropolitan Districts)	29,238,582	23,045,544	6,193,038	26.9	100.
Central Cities	22,111,380	17,673,818	4,437,562	25.1	71.7
Outside Central Cities	7,127,202	5,371,726	1,755,476	32.7	28.3

* For a definition of "metropolitan district" see Footnote 3 on preceding page.
† *United States Census*, Vol. I, 1920.

best described as "overgrown villages," as lives in the three largest cities, and that the "popularity" of the small communities did not apparently wane during the last census decade. In this connection it is significant that the population of suburban territory within metropolitan districts increased considerably faster than in the case of central cities forming the nuclei of the metropolitan districts. Finally, when one considers the projection of past tendencies into the future, one should recall that only 63 of the 287 cities containing 25,000 or more people in 1920 increased in population at a rate higher than 50%,

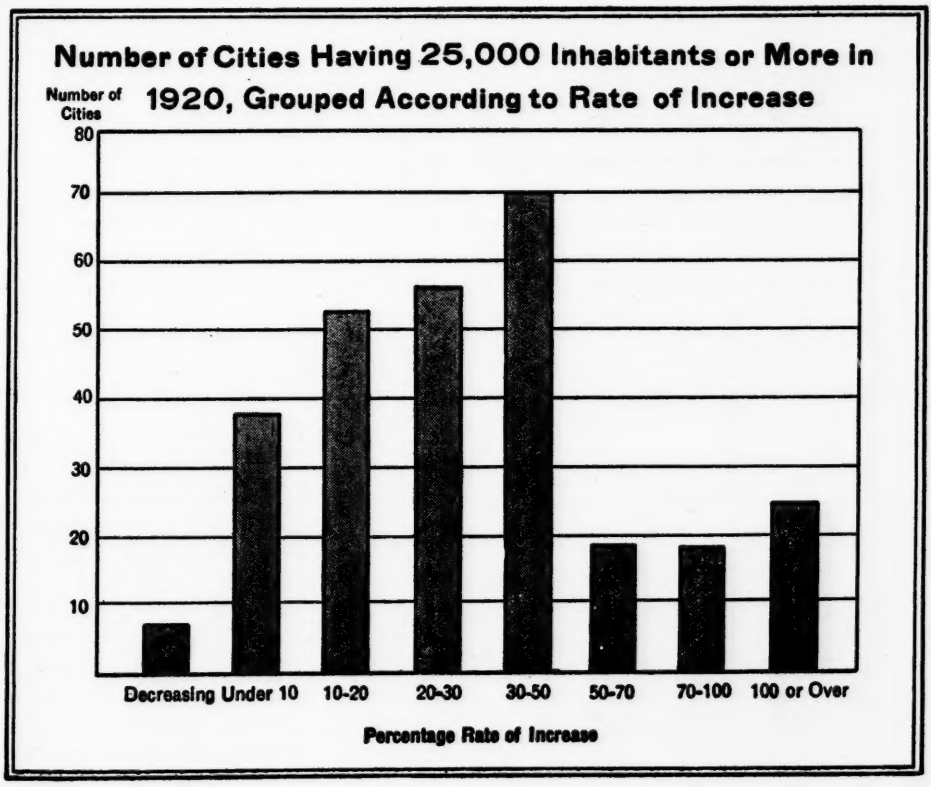


TABLE XII. INCREASE IN POPULATION OF METROPOLITAN DISTRICTS OF CITIES HAVING 500,000 INHABITANTS OR OVER IN 1920, 1910-1920 *

District	Population		Absolute Increase	Percentage Increase	Percentage of Total Increase
	1920	1910			
Total (13 Metropolitan Districts)	23,309,222	18,370,757	4,938,465	26.9	100.0
Central Cities†	17,200,842	13,803,758	3,397,084	24.6	68.8
Outside Central Cities	6,108,380	4,566,999	1,541,381	33.8	31.2

* *United States Census*, Vol. I, 1920.

† San Francisco and Oakland are treated as one city in this analysis. This is also true of Minneapolis and St. Paul. Newark and Jersey City are included within the metropolitan district of New York.

and only 25 doubled or more than doubled their population; furthermore, these increases are largely the result of special factors, since the majority of urban communities grew at a normal rate compared with the rate of urban growth for the country as a whole.

Clearly, urbanization is a gradual process; its character and extent are the results of over a century of population growth and change in the United States. There is no reason to believe that the trend toward greater urbanization will not continue, but, on the other hand, there is no basis for the supposition that it will take place with leaps and bounds so that in a few years the United States will become a nation of city-dwellers dependent upon the rest of the world for the necessities of life.

There are factors making for decentralization and other factors operating toward even greater centralization. Cheaper rapid urban transportation has made for wider distribution of residential utilization. Automobile and bus transportation will operate to increase further the area available for residential utilization. Increasingly, industries are finding it profitable to locate outside of and away from the more concentrated areas. Trade and commerce, on the other hand, continue to operate as factors making for increased concentration. The relative importance of these two groups of forces may be expected to determine the future trend of urbanization in the United States.

The city of the future will probably resemble the metropolitan areas that are now developing in certain parts of the United States more than the closely knit political city unit with which we have been familiar in the past.

TABLE XIII. INCREASE IN POPULATION OF METROPOLITAN DISTRICTS OF CITIES HAVING 200,000–500,000 INHABITANTS IN 1920, 1910-1920 *

District	Population		Absolute Increase	Percentage Increase	Percentage of Total Increase
	1920	1910			
Total (16 Metropolitan Districts)	5,929,360	4,674,787	1,254,573	26.8	100.0
Central Cities†	4,910,538	3,870,060	1,040,478	26.9	82.9
Outside Central Cities	1,018,822	804,727	214,095	26.6	17.1

* *United States Census*, Vol. I, 1920.

† Kansas City, Missouri, and Kansas City, Kansas, are treated as one city in this analysis.

DEPARTMENTS

The departments of the JOURNAL are edited specifically with regard to their interest to the readers who are especially concerned with the economic problems of land and public utilities. For the most part the material for the departments will be prepared by members of the staff of the Institute for Research in Land Economics and Public Utilities.

BOOK REVIEWS

This department contains critical reviews and brief notices of new books of interest to the readers of the JOURNAL.

BENJAMIN HORACE HIBBARD, "A History of the Public Land Policies"..... *Joseph Schafer* 238

SIDNEY L. MILLER, "Railway Transportation, Principles and Point of View"..... *Lewis C. Sorrell* 241

H. L. LUTZ, "Public Finance"..... *Harry Jerome* 243

HOMER B. VANDERBLUE, "Problems in Business Economics"..... *Mary L. Shine* 244

THOMAS H. KENNEDY, "An Introduction to the Economics of Air Transportation"..... *Sidney L. Miller* 245

SUMMARIES OF RESEARCH

In this department of this number are given accounts of investigations in progress. Statements of tentative conclusions reached in the course of work by the staff of the Institute and those associated with them in their work will be presented in this department in subsequent issues.

Operating Experience of Public Utilities in Wisconsin, 1909 – 1923..... *Herbert B. Dorau* 247

COMMENTS ON LEGISLATION AND COURT DECISIONS

Here the readers of the JOURNAL will find a department devoted to a miscellany of summaries, interpretations, and notices of recent legislation and court decisions that have economic significance in a consideration of land and public utility problems.

A Focal Point of Conflict in Judicial Opinion on the Valuation of Public Utilities..... *Martin G. Glaeser* 250

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HENRY STRONG RESEARCH FELLOWS

MARCUS WHITMAN ROSALIND TOUGH

BOOK REVIEWS

Hibbard, Benjamin Horace. A HISTORY OF THE PUBLIC LAND POLICIES. *New York: The Macmillan Company, 1924. XIX, 591 pp. $4.50.*

THIS is a noteworthy book, representing an enormous amount of painstaking research and illustrating in every part the intelligent critical insight of the trained economist and student of American agricultural history. "The aim," says Professor Hibbard, "has been to put into one moderate-sized volume a sketch of the historical development and operations of our federal land policies." The subject being so vast, he anticipates the disappointment of special students, on the one hand, who desire inclusiveness, and general students, on the other, who may find more detail than they desire. But what the author wanted was "a complete sketch, which precludes the possibility of a complete treatment of each and every phase."

There are 28 chapters, of which the first 4 deal with land as a source of revenue, the acquisition of the public domain and its disposition prior to the inauguration of the constitutional system, and the pioneer government land policies of the years 1789 to 1804. The second group, Chapters V–X, covers the credit sales to 1820, the change to the cash sales basis, special preemption acts and the general act of 1841, together with military bounty grants and the distribution of the proceeds of land sales. It seems logical to make the third division at Chapter XVIII and to include the treatment of claim associations and speculation, grants for internal improvements, for education, and interweaving chapters on swamp lands and the graduation of land prices by the government, concluding with the homestead act of 1862 and its later modifications. There seems no better way to hint at the contents of the last part of the book than to name the 10 chapter titles, which are: The Timber Culture Act; The Desert Land Acts; Disposal of Timber and Timber Lands; The Period of Conservation; Grazing the Public Domain; Classification of Public Lands; Mineral Lands; Reserved Lands; Effects of the Land Policies on Agriculture; and The Public Land Policies Reviewed and Criticized. There is a bibliography of general works, of public documents under the separate rubrics "Colonial," "Federal," and "State"; also a short list of railway papers, and a short, inadequate index.

There will be, as he anticipated, two opinions on the question of the author's success in carrying out his project. To one who classifies himself as neither a specialist in the subject nor yet a "casual reader" the book is not uniformly easy to read, despite the fact that it is written in a style which is generally agreeable and often decidedly pungent. I suspect the difficulty lies in the crowded character of some chapters which contain matter enough to fill comfortably half again as many pages. Moreover, a large proportion of this material is necessarily of the kind often characterized as "mere facts"—legislative and administrative details included for the sake of completeness but deficient in interest to one who is not a specialist.

There, indeed, was a problem for the author. Should he strive to make the book interesting at the possible expense of its value for reference, or secure the latter at all costs? Professor

Hibbard chose the second alternative and it must be admitted that by so doing he gained for the book an indisputable preeminence on the score of usefulness. It might have been possible to make the story simpler and more readable if general topics like those covered in Chapters VIII and XXII, and paragraphs from others, had been thrown into a comprehensive general introduction along with the matter of Chapter I and possibly Chapter II—all in a more condensed form than has been given to their treatment where they stand. Another means of saving space, without sacrificing authenticity, would have been to summarize succinctly, in his own words, many of the statements so generously quoted from his sources.

One wonders if, by some such policy of space conservation, it might not have been possible to introduce a limited amount of material, of which the author must have had a superabundance, designed to intensify the human interest phases of the story. The reader would welcome concrete examples of land speculation with the use of military warrants or other forms of "scrip." Such a fact as W. H. H. Beadle's agency in securing the restriction on the sale of school lands in the enabling act for South Dakota, which generalized the principle for the other "Omnibus" states, is both interesting and important. Of outstanding significance and dramatic, even tragic interest, were the land-fraud cases of 1903 growing out of the maladministration of the Timber and Stone Act. To depict Roosevelt as the outraged guardian of the nation's rights in the remaining public lands and Francis J. Heney as the "avenger" would have sensibly livened up the chapters on the disposal of timber land and on conservation.

However, Professor Hibbard doubtless considered this problem from every angle and one must respect his decision as at least a defensible choice among the alternatives before him. The book possesses so many excellencies that we can only hope in this case that utility, if not dramatic interest, will have marked it for a "best seller." It is precisely the kind of book which every legislator and public man, as well as the serious private student of American history, ought to read.

Its first great merit is that it embodies a fresh study of the stupendous mass of material on the shaping of our public land policies which is found in the congressional debates and reports, in the statutes at large, and the reports of the commissioners of the General Land Office. Since the history of the public lands has been continuous down to the present, the latest book on the subject is almost of necessity the most complete. This work, however, supersedes earlier ventures in its field not only because it comes down to our own times but because it signalizes the author's rather heroic resolve to make his survey of the printed sources, through the period covered, definitive.

In specifying his main sources for the study of land policies, it is not intended to restrict the research performed on that aspect of the theme, for many subsidiary sources were used, as bibliography and footnotes amply testify. More especially, however, I want to call attention to what may be described as the practical phase of this study, the history of land policies in operation. Here the author makes a large and valuable contribution. The valuable and brilliant essay on the national land system to 1820, written by Professor Treat, concerned itself solely with the disposition of the lands by the government, excluding entirely "the uses to which the

lands were put." The indispensable, encyclopedic, but chaotic history of the public domain by Donaldson, is quite innocent of the dynamic view of public land history. We have, therefore, in Hibbard's book, a new conception and treatment of the subject, one which like other pioneer enterprises is probably not the final word as to aims and methods, yet a highly important and suggestive one. Among the chapters which illustrate this feature of the book are those on claim associations, speculation, grants for internal improvements, grants for educational purposes, and grazing the public domain. In addition, much of the discussion of the homestead and all of that on the period of conservation, on the classification of public lands, the effects on agriculture, and the luminous chapter in review and criticism of the land policies develop this idea. In fact the entire work is penetrated with it. The reader is quickly made aware that the author's major interest does not lie in the development of machinery for transforming public land into private holdings. It lies rather in the fortunes of those farmers who wanted land for cultivation, the miners whose objective was mineral wealth, the stock ranchers bent upon the utilization of pasturage, and the lumbermen on economically changing standing timber into a marketable product. The character of the land in the several distinct physiographic provinces, the problem of markets, the impulses to western emigration, the reaction of land sales under a given policy upon the policy itself, the political aspects of the problem such as the project of paying the national debt out of the land fund, the question of distribution of the proceeds of land sales among the states, the persistent conflict of interest between the northeastern states and the West—all of these are matters about which the author has both sound information and intelligent views.

The author of a first edition is entitled to escape criticism for small errors of proof-reading, unless such errors are too numerous. In the book under review there are errors of this kind to a considerable number, but perhaps not more than in the average new book; and there is nothing which will puzzle the intelligent reader for more than a moment.

Doctor Hibbard has been fortunate in avoiding serious errors or omissions of fact. Yet his statement, page 85, that the same requirements which were imposed on Louisiana "were imposed on seventeen states" assumes that all of the states named in the list quoted from report Number 121, 46th Congress, Senate, were prohibited from taxing lands sold by the government to individuals until after they had been in private hands five years. The fact is, that from the year 1836 that burdensome restriction was omitted from the enabling acts, Michigan and Arkansas being the first states to be freed from it, the other public land states being relieved by the general act of 1847 to which Hibbard elsewhere alludes. Curiously, too, in view of his thoroughness in other particulars, the author makes no mention of "floating rights," a feature of the preemption law of 1834 (expiring in June, 1836) which for a time brought that law and the preemption principle under general condemnation. The withdrawal of "floats" from the market, together with the certainty that the lands would be taxed from the day they became private property, operated as a check on speculation in Michigan, and no doubt in other new states and territories, after 1836. In Wisconsin, for example, Daniel Webster paid the 1838

taxes on 1360 acres of land which had been entered by Lucius Lyon in 1836.

In spite of these slight defects, the book contains a solid and permanent contribution to our national history in one of its most vital and hitherto neglected aspects. It is hoped that a second edition may be called for almost immediately. That will afford the requisite opportunity for eliminating the minor faults noted above.

JOSEPH SCHAFER

Miller, Sidney L. RAILWAY TRANSPORTATION: PRINCIPLES AND POINT OF VIEW. *Chicago: A. W. Shaw Company, 1924. XXVII, 905 pp. $4.*

AFTER a lull of several years in the production of books dealing in a general way with the subject of railway transportation, several such treatises have appeared in the last year or so. Doubtless this has been occasioned in part by the insistent inquiry from various sources for suitable text-book material. Also, the changes in regulatory policy embodied in the Transportation Act of 1920 necessitated revision of pre-existing treatments of the subject. Furthermore, transportation problems seem to challenge the attention of the country as much as ever; and this challenge, and the revolutionary changes which the automobile has introduced, seem to have revived interest in this fascinating group of problems. But whatever may be the precise cause, or the importance to be assigned to any specific cause, the result is assuredly welcome.

Among the more recent books referred to above is that offered by Professor Miller of the University of Wisconsin. In this volume, Professor Miller presents a treatment of his subject, which, though not strikingly different in method of approach from many preceding texts, does nevertheless command attention because of the thoroughness with which he expounds the subject.

In reviewing an achievement of this sort, the reviewer is usually limited to one or more of three methods: (1) he may simply inform the reader concerning what the author has done; (2) he may combat some of the ideas advanced by the author; or (3) he may attempt an evaluation of the author's accomplishment. Despite the absence of any very suitable standards by which an author may be judged, the present writer is tempted to adopt the third method, and enter upon an appraisal.

Although perfectly definite standards are lacking, questions are not. Two questions suggest themselves at once: (1) Does the author accomplish what he sets out to do? (2) Is his objective conceivably the most worth while one he could have chosen? Applying the first question to the present case, two subordinate questions appear; namely, what is Professor Miller's purpose? and has he seemingly carried it to a successful conclusion?

It seems to the writer that Professor Miller's objective is that of giving a present-day reader who is presumably unacquainted with railway transportation and its development, an impartial review of the problems of railway regulation. "Throughout the entire volume an attempt has been made, in the presentation of historical material and in analyses, to judge from the public point of view. For, after all, the prime purpose of the railway is *public service* (italics are the author's), not a generous return upon invested capital or high wages to employees." Thus the prime purpose is public service; the problems are those of securing devotion to public service by private capital and labor, which is oftentimes otherwise motivated. To secure such devotion govern-

mental regulation is needed; much has been secured, and more may be required. To deal with this intelligently, the citizen in a democracy must be informed regarding such regulation in the past—why it was necessary, what it has accomplished, and where it has failed.

With this purpose in mind, the logical arrangement of Professor Miller's book is apparent. The first of its four sections deals at length with the history of the "American Railway Net." While the general development is naturally a chronological one, the discussion is replete with analysis. Not merely "what happened?" but "what factors were responsible for making it happen?" are the questions kept constantly before the reader. The historical section is presented as a background for a more intelligent understanding of the necessity for, and the problems of, governmental regulation.

The second section, which deals with the services of railways, and the third, which deals with the economics of the railway situation, are likewise related to the purpose. Of these two, that dealing with the economics of railways is the more significant, for it explains why competition failed to be an adequate safeguard of public interest, and therefore, why regulation became a necessity. But even the section on services is conducive to that end, for it includes chapters on the railway corporation, passenger, express and mail charges, which are necessary material for a complete understanding of subsequent sections. Probably the chapters on the organization of railways and the freight services are the least indispensable from the dominant point of view; the motivation of students with some other interest in view may perhaps justify their inclusion.

The final section, which occupies about one-third of the book, deals with the regulatory policy of the state and federal governments, both historically and critically. The contribution which Professor Miller has made here consists in a remarkably thorough exposition of this aspect within the space available, and the inclusion of certain details which preceding authors have usually omitted. It is the reviewer's opinion that the author has done his most effective work in the first and last sections of his book; and that he has done very well indeed.

Regarding the second main question, whether the objective chosen is the one most worth while, there will be more difference of opinion. The author has presumably worked out his material in the classroom; and he offers it to the reader generally, but with its classroom use dominantly in view. Such development of the subject, therefore, is apt to be influenced by local considerations and also by traditional attitudes. It may not be altogether a matter of regret that no two courses in transportation are taught alike, especially during the earlier years of experimentation; but there unquestionably is an offsetting loss. And it is further to be emphasized that tradition plays its part in this situation. Historically it appears that many of the courses, now regarded as integral parts of the economics curriculum, wandered in because of the presence of some controversial question of public policy. They did not enter the curriculum because of any well-thought-out plan regarding the content of a well-balanced course of economic training.

In this respect transportation courses appear to have experienced about the same development as other courses in economics. Transportation, like finance, became an important public question: accordingly, courses in transportation and in money and banking made their

appearance. The point of view of both was public policy, for that was their motivation. This was probably inevitable. But it seems to the writer that now is the time to take stock of this situation. The chief questions then would be, What constitutes a balanced economic training? And what sort of a course in transportation should be given in order to accord with this notion of a balanced course in economics?

The discussion of this topic is far beyond the limitations of this review; but to reenforce his observation that more objection may be raised to Professor Miller's purpose, the writer feels impelled to suggest an alternative procedure. To phrase it in question form, would it not be preferable to give both the general reader and the student a view of the general significance to industrial society of all the transportation agencies? Would not their comprehension of railway economics be heightened by a comparison with other agencies of transportation? And even from the standpoint of public policy, do not many of the most important questions today lie in the territory of transportation coordination? And if the answer to these questions be in the affirmative, would it not then follow that our major efforts should be directed toward an exposition of society from the transportation standpoint, and not merely of the questions of public policy that involve the railway? This observation, of course, applies with equal force to other books that are devoted exclusively to steam railway transportation.

Although Professor Miller has followed the traditional course, he has produced a noteworthy treatise. It is comprehensive, according to the point of view he has chosen. It is readable, balanced, and convincing. The style is intriguing; and there is an orderly advancement of ideas, which gives to the reader a definite sense of progression. The necessities of the classroom have not been overlooked. That the author has as nearly succeeded in observing impartiality as it is possible for any one possessing convictions to do, can hardly be gainsaid.

LEWIS C. SORRELL

Lutz, H. L. PUBLIC FINANCE. *New York: D. Appleton and Company, 1924. XVI, 681 pp. $4.*

THIS volume is a comprehensive and yet reasonably intensive survey of the principles of public finance, under the traditional subheads of Public Expenditures; Public Revenues, including Taxation; Public Credit; and Financial Administration and Legislation.

While in form and treatment it is particularly well adapted for use as a text-book, and will, in the judgment of the reviewer, be gratefully welcomed by the instructor in public finance, it is also a mine of well-organized information for the consideration of the taxpayer, legislator, or tax administrator.

There is the necessary minimum of historical background, but the emphasis is upon the principles, the fiscal and economic effects, and the significant administrative problems involved in current American practices. Much of the volume is of value to the student of land economics, but this fact may not be obvious upon superficial examination. To discover the most pertinent sections, it is necessary either to scan the table of contents closely or to read considerable portions of the book—not an unprofitable undertaking. To illustrate, conclusions against the fiscal expediency of the practice of excess condemnation and, pending further knowledge of their effect on values, a tentatively adverse decision against the desirability of special assess-

ments for highway improvements, are concealed in the chapter on Administrative Revenues. The treatment of the "single tax" is relatively scant and, on the whole, adverse. Most of the discussion of land taxes is found in the three excellent chapters on Means of Escape from Taxation; The General Property Tax; and Modified Property Taxes.

As indicative of the lessened emphasis placed upon certain tax problems, it is noteworthy that but five pages are devoted to the tariff and less than two to war and excess profits taxes.

The reader who is at all familiar with the complexity of modern American tax systems will be impressed with the skill with which the author has brushed aside obsolete or minor issues and concentrated attention upon live problems. It is not to be expected that any one will agree with all the conclusions expressed in the book, but all will be impressed with the fact that the treatment is moderate and sane throughout, so much so, in fact, that one misses somewhat the zest which comes from a sharp disagreement with the author.

HARRY JEROME

Vanderblue, Homer B. PROBLEMS IN BUSINESS ECONOMICS. *Chicago: A. W. Shaw Company, 1924. XIX, 625 pp. $5.*

THE traditional method of education, by which the student is given general principles, which, it is hoped, he will later be able to apply, is being abandoned to a great extent by those professional and semiprofessional schools which expect their graduates to be capable of doing, as well as of knowing, from the outset of their careers. The "case system" of training, which presents concrete problems and extracts from them the principles involved, may not be the panacea for all our educational ills, but its use has been attended with considerable success in a number of institutions. One of the recent additions to the number of case-system textbooks is the present work of Professor Vanderblue.

This is a volume of considerable size, intended chiefly for students of business economics but also for the use of business men who wish to look into the economics of their own enterprises. Part I is a general discussion of the business cycle, but only its first chapter is theoretical. Other chapters take up (1) the forecasting of business conditions, illustrated by the Harvard Index Chart; (2) the cyclical variations in such phases of business as manufacture, mining, employment, prices, and production; (3) the effect of the business cycle on advertising; (4) its effect on merchandising; (5) its effect on bond yields and money rates. The section concludes with an account of the control of an actual industry (the Walworth Manufacturing Company) throughout a business cycle, written by the president of the company.

Part II presents a great number of definite problems that have arisen in various business enterprises during the course of the latest business cycle. It is the longest section of the book and the one which has given the work its title.

The problems presented are taken from businesses supplying the most varied types of commodities and services, ranging from chocolates to iron ore, from suspenders to automobiles, from farm products to public utility services. In each case the problems that the business executives had to meet are explained and frequently their solution is stated, with the reasons why they decided as they did. The outcome of the policy decided upon is not given, and

there is, therefore, opportunity for class discussion of the wisdom or lack of wisdom in each decision in these cases as well as in reasoning out the logical conclusions in the other problems. The cases studied have been grouped into three large divisions according to the nature of the problem—(1) financing, (2) operating, (3) distributing—and then into subclasses within these groups.

Part III deals with the measurement of the business cycle in any particular business, showing with painstaking detail how the data provided by the business must be used and corrected in order to make indexes comparable with the various indexes that are used at present for business forecasting. A last chapter gives these current indexes, in detailed tables, carrying them through the year 1923.

The book seems well fitted to serve both the needs it was intended to meet. The college student is supplied with an immense number of concrete problems that give him an insight into actual conditions in the business world. The intelligent business man is supplied with sufficient information as to methods and sufficient illustrations of application of these methods to enable him to examine his own business, to choose the data that are useful, to treat them according to the principles of statistics, and to interpret them.

MARY L. SHINE

Kennedy, Thomas H. AN INTRODUCTION TO THE ECONOMICS OF AIR TRANSPORTATION. *New York: The Macmillan Company, 1924. XII, 154 pp. $2.*

DESPITE the fact that the world has witnessed spectacular progress in the development of air transportation during the past 20 years, little effort has been made to present in a formal manner to the reading public the fundamental principles and problems of this field. It is, therefore, with particular interest that casual reader and student alike will open the covers of Kennedy's *Introduction to the Economics of Air Transportation.* And those who do not insist upon too close conformance between title and text material will be in no wise disappointed, for much interesting information of a historical and current character is presented.

As a background for the study of heavier-than-air craft, the history and technical features of the lighter-than-air craft are presented in brief form and in non-technical language. The gradual evolution of the balloon, first used by Montgolfier in 1783 and subject to many disadvantages, into the modern Zeppelin type of craft is interestingly described. The problems of construction of the "air-ship" are suggested, and mention is made of actual or projected "air-ship lines."

The heavier-than-air "ship," however, seems to command the author's chief interest, and to it he devotes a major portion of his book. Beginning with the discussions of Da Vinci and Borelli in the early Middle Ages, the development of flying is sketched. To this development Langley, the ill-starred American, contributed. But other Americans, the Wright brothers, received credit for final success. Yet abroad interest has been keenest: "The apathy of the American public and the United States Government on the question has been paid for at a dear price. Pilots without number have lost their lives because they were forced to fly in planes that were thrown together by persons more experienced in wagon building." In the treatment of the technical features of the aeroplane many interesting facts are brought out. Among these perhaps the most striking to the layman

is the importance of experimentation with models in wind tunnels, so-called; wind-tunnel tests "showed the Curtiss-Army racer to be capable of a speed of 219.8 miles an hour; whereas, on its first flight, the official timing of its actual speed showed it to be 219.5 miles." By these tests, too, the types of machines which offer minimum air resistance are found.

The discussion of actual aeroplane operations occupies the greater part of the book, here appearing, among other matters, an interesting history of the United States Air Mail Service. Brief mention of the United States Army Model Airway is also made, but undue emphasis in this chapter seems to be put upon the organization for cost-finding rather than progress in aeronautics. The book closes with two chapters which will be of doubtful interest either to the layman or to the student, the first of these chapters consisting only of the "log" of a European air tour and the second of a mere listing of the European air lines operating in 1923. Thus, starting interestingly, the book tends to lose the reader toward the close. And, certainly, the writer and publisher were unfortunate in their choice of titles: the student searches the book almost in vain for that economic analysis which the name given it seems to promise. A less pretentious title would have led to lesser expectations and, perhaps, no disappointment. For the writer has given to the public, in this pioneer field, a volume deserving of commendation.

SIDNEY L. MILLER

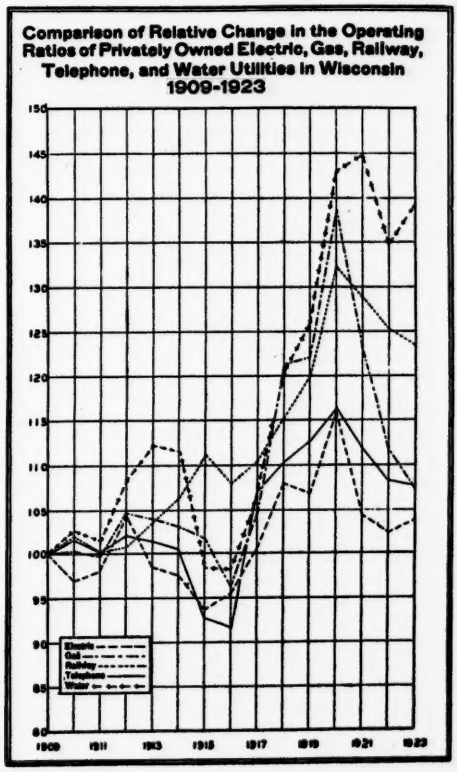
SUMMARIES OF RESEARCH

OPERATING EXPERIENCE OF PUBLIC UTILITIES IN WISCONSIN, 1909–1923

STUDIES of the comparative operating experience of different classes of public utilities show that they were not all affected to the same extent or in the same way by the violent price changes of the war and post-war period. An analysis of the financial experience of public utilities in Wisconsin affords an illustration of the comparative effect of the changes brought about by the war and the post-war conditions. The published and unpublished records of the Wisconsin Railroad Commission reaching back as far as 1909 make such a study possible. Utility company reports are rendered to the Railroad Commission of Wisconsin by utilities—that is, every public utility corporation is required to keep distinct operating accounts for each separate utility service which is rendered. Thus it is possible to segregate revenues and expenses according to the character of the service rather than by corporations.

The accompanying table and chart summarize the results of a preliminary study of revenues and expenses by classes of utilities in Wisconsin. Excepting the water utilities, every class of utility had the highest average operating ratio in the year 1920. The operating ratios for the gas utilities were in that year 38.6% higher than the base year 1909, electric railways 32.1% higher, whereas telephone and electric utilities had operating ratios only 16.2% and 15.8% higher than in 1909.

The trend represented by the curve for the water utilities is hardly representative of the general experience of water utilities during the period 1909 to 1923. Almost all of the larger water plants are municipalized. In the later years only one large-sized privately owned water utility remained. Very generally the privately owned water utilities in Wisconsin are found only in the smaller and poorer cities. The extremely rapid rise in average operating ratios for this utility is primarily, then, accounted for by the fact that the more efficient and larger units have been successively excluded from the average for



the year. Rate increases have also seemingly not taken place as generally as for other classes of utilities.

The gas utilities show the most striking rise in operating ratio of any class of utility. This was due principally to the very rapid increase in the price of coal and oil with a resultant rapid rise in operating expenses. While the relative rise in the operating ratio of the gas utilities was greater than that of all other utilities except water—surpassing even the railway utilities from 1918 to 1920—yet it should be noticed that the drop in the operating ratio was similarly precipitous, falling from the index of 138.6 in 1920 down to 107.2 in 1923. The rapid decline in the operating ratio is due to marked decreases in the price of coal and oil and the fact that rates for this utility may be said to have been in general adjusted very satisfactorily and quickly to the changed price level. It should be pointed out that the figure for the year 1923 is not strictly comparable to similar figures for preceding years in the case of the gas utility in that the method of treating revenues from the sale of by-products was changed as of January 1, 1923. The effect of this change in accounting method on the figure for 1923 is, however, probably not very significant.

Electric railways have maintained a higher average level than the gas utilities, even though not rising as sharply to as high a point in 1920. The electric railways also have not recovered with the rapidity with which gas utilities recovered. This is probably due in the first place to the fact that labor cost rather than cost of materials played a larger part in the operating expenses of the electric railways. Wages did not rise as sharply as prices of materials, neither have they receded appreciably since 1920. Electric railway rates and particularly those on interurban and suburban lines have not been increased to the same extent as rates for other util-

COMPARATIVE OPERATING RATIOS OF PRIVATELY OWNED ELECTRIC, GAS, RAILWAY, TELEPHONE, AND WATER UTILITIES REPORTING TO THE RAILROAD COMMISSION OF THE STATE OF WISCONSIN, 1909-1923*

YEAR	ELECTRIC UTILITY†		RAILWAY UTILITY†		GAS UTILITY		TELEPHONE UTILITY		WATER UTILITY	
	Ratio	Index	Ratio	Index	Ratio	Index	Ratio	Index	Ratio	Index
1909	66.0	100.0	67.6	100.0	66.4	100.0	76.1	100.0	49.4	100.0
1910	64.5	97.0	68.9	101.9	66.6	100.3	77.3	101.6	50.6	102.4
1911	65.4	99.1	67.7	100.1	66.2	99.7	76.2	100.1	50.1	101.4
1912	68.7	104.1	68.1	100.7	69.4	104.5	77.6	102.0	53.6	108.5
1913‡	65.0	98.5	69.9	103.4	68.9	103.8	77.1	101.3	55.4	112.2
1914¶	64.4	97.6	71.7	106.1	68.4	103.0	76.5	100.5	55.1	111.5
1915	61.9	93.8	75.0	111.0	67.5	101.7	70.6	92.8	48.6	98.4
1916	63.0	95.5	73.0	108.0	64.0	96.4	69.7	91.6	48.5	98.2
1917	66.4	100.6	74.6	110.4	69.3	104.4	81.4	107.0	52.8	106.9
1918	71.3	108.0	77.8	115.1	80.1	120.6	83.9	110.3	59.5	120.5
1919‖	70.5	106.8	81.0	119.8	81.4	122.6	85.7	112.6	62.2	125.9
1920	76.4	115.8	89.3	132.1	92.0	138.6	88.4	116.2	70.6	142.9
1921	68.8	104.3	87.1	128.9	81.8	123.2	85.1	111.8	71.5	144.7
1922	67.5	102.3	84.6	125.2	74.2	111.8	82.4	108.3	66.5	134.6
1923	68.4	103.6	83.5	123.5	71.2	107.2	81.7	107.4	68.7	139.1

* Compiled from the published reports of the Railroad Commission of the State of Wisconsin for the years 1909 to 1916. From 1916 to 1923 the unpublished records of this commission were used. Attention is called to the fact that the Commission includes in operating expenses taxes, rentals, and depreciation charges.

† Financial reports to the Wisconsin Commission are by "utilities." The revenues and expenses for each service are thus segregable. The operating ratio is the percentage relation of operating expense to operating revenue.

‡ From 1909 through 1913 the year for the telephone utility ends with June 30; thereafter the fiscal year is the calendar year

¶ The reports of the telephone utility are for 18 months ending December 31. The figures here given are based on an estimate for 12 months on the basis of revenues and expenses for the 18 months.

‖ The fiscal year ends with June 30 for all utilities, except telephone, for the years 1909-1910. Thereafter, the fiscal year is identical with the calendar year for all classes of utilities.

ities. Competition of other means of transportation has the effect of setting a limit to what may be done by rate increases to meet the increased expenses of this utility.

That the electric and telephone utilities show, *comparatively,* little relative variation in the movement of average operating ratios over the period 1909 to 1923 can be accounted for only by the fact that it was possible in these utilities to improve materially the efficiency of operation. Thus technical improvements in these two utilities appreciably offset the tendency toward higher operating ratios experienced by the other utilities. In the electric and telephone utilities there is an increasing investment in fixed capital per customer, and the effect of this would necessarily be in the direction of a lower ratio of operating expenses to operating revenues. Expenses of telephone and electric utilities increased absolutely as in the case of all other classes of public utilities, but the marked improvement since 1920 cannot be said to be due to any material decrease in the expense level. In both of these utilities it has been possible to allow rates sufficiently high to keep the operating ratio within the limits experienced. In the case of electric utilities the average rates are not appreciably, if any, above pre-war levels. The comparatively high average operating ratio of the telephone utility may be explained in several ways. Rentals are an important expense item for this utility and are treated as an operating expense. It is also probably true that in no other class of utility service is the same careful and adequate provision for depreciation made.

HERBERT B. DORAU

COMMENTS ON LEGISLATION AND COURT DECISIONS

A FOCAL POINT OF CONFLICT IN JUDICIAL OPINION ON THE VALUATION OF PUBLIC UTILITIES

ABOUT three decades have passed since the valuation doctrine, in its early inchoate form, began to appear in the decisions of our courts. It attained the status of a rule of law in the opinion in *Smyth* v. *Ames*, 169 U. S. 466 (1897). Without attempting at this time to discuss in detail the origin and full meaning of this rule, it becomes necessary to quote the rule at length in order to appreciate the conflict which it has occasioned.

> We hold, however, that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public. And in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth.

This excerpt has become a classic quotation in the literature of valuation. It has controlled the thought and activity of legislatures and commissions from that day forward, while courts have heeded this authoritative text with a unanimity which has tended to raise it to the level of a rule of property.

We may epitomize the rule by saying that it requires, (1) the finding of a *fair value* of property; (2) the use of investment costs, present reconstruction costs, and the par value and market value of outstanding securities as evidentiary facts of value; (3) the weighting of these evidentiary facts in an exercise of the judgment which constitutes the finding of fair value; (4) the use of the fair value as the *basis of a calculation* whose object is the determination of the probable earning capacity of the public utility under the rates fixed by legislative authority when account is taken of the sum required to meet operating expenses. Succeeding decisions by the courts have amplified the rule and elaborated the procedure required under it. We will also leave out of account the history of this development.

In 1923, however, the Supreme Court of the United States in the *State of Missouri ex rel. Southwestern Bell Telephone Co.* v. *Public Service Commission of Missouri et al*, 43 Sup. Ct. 544 (1923), had before it a case in which the evidentiary facts induced two members of the bench, Justices Brandeis and Holmes, to question the workableness of the rule. The state commission had fixed the fair value for the purposes of that case at $20,400,000. This finding was based upon appraisals prepared by the commission's engineers of constitu-

ent properties in 1913, 1914, and 1916, together with the actual cost of additions subsequent to these dates. The company produced evidence purporting to show that the property inclusive of working capital had cost $22,888,943. The company's engineers estimated as of June 30, 1919, that the cost of reproduction new of the physical property inclusive of working capital was $29,506,052 and the cost of reproduction new less depreciation of the same items was $25,760,859. The majority opinion accordingly criticised the commission's finding because "the commission undertook to value the property without recording any weight to the greatly enhanced costs of material, labor, supplies, and so forth, over those prevailing in 1913, 1914, and 1916. As a matter of common knowledge, these increases were large. Competent witnesses estimated them as 45% to 50%." The court finally concluded "that for the purposes of the present case the valuation should be at least $25,000,000." Thus the issue presented by the facts was this: Ought the commission in accordance with the valuation rule of *Smyth* v. *Ames* to have ascertained the present (that is, June 30, 1919) cost of construction and used it as an evidentiary fact in making up its mind as to the fair value? It is upon this question that the court divided.

We shall first give the view of the majority. "It is," they say, "impossible to ascertain what will amount to a fair return upon properties devoted to public service without giving consideration to the cost of labor, supplies, and so forth, at the time the investigation is made. An honest and intelligent *forecast of probable future values* made upon a view of all the relevant circumstances is essential. If the highly important element of present costs is wholly disregarded, such a forecast becomes impossible. Estimates for tomorrow cannot ignore prices of today."

The above can be interpreted in only one way: that the cost of reproduction must be ascertained in every rate proceeding in order to test the validity of rates applicable to the future by referring their prospective revenue yield to present-day costs of construction and operation. In fact, it would not be amiss to point out that a new evidentiary fact has been injected into the situation when the court says that "an honest and intelligent forecast of probable future values * * * is essential." This gives to the concept of "fair value" an aspect of futurity. It is not the "fair value" alone as judgment may reveal it from a consideration of price levels in their present or past aspects, but future price levels should cast their shadows before.

The court does not refer to the leading case. It finds support for its contention that present costs should be considered by referring to *Wilcox* v. *Consolidated Gas Company*, 212 U. S. 19, 52 (1909), where the sentence occurs: "If the property, which legally enters into the consideration of the question of rates, has increased in value since it was acquired, the company is entitled to the benefit of such increase." It also quotes with approval from the *Minnesota Rate Cases*, 220 U. S. 352, 454 (1913), that "the making of a just return for the use of the property involves the recognition of its fair value if it be more than its cost. The property is held in private ownership and it is that property, and not the original cost of it, of which the owner may not be deprived without due process of law." In this view fair value becomes an attribute of property objects held in private ownership. It makes no differ-

ence what the objects of property may be or may be used for; it is enough that they be held in private ownership in order to make a universal rule of property law applicable that the owner is entitled to have them valued as they stand in the markets of the world.

The minority view appears to proceed from an entirely different starting point. While the valuation doctrine is accepted as the *starting point in calculations* made for the purpose of determining whether rates are constitutionally compensatory, its analysis of the problem of fair valuation or reasonable valuation of public utility property does not proceed upon the analogy with ordinary private property. By implication, at least, it goes back to the common law rights and duties of public utilities in their relations with those whom they serve. Justice Brandeis, after stating that he regards the so-called rule of *Smyth* v. *Ames* as "legally and economically unsound," gives his interpretation of what the rule of valuation should be in order to afford the private owners the protection which the Federal Constitution supplies:

> The investor (*i. e., the private owner*)[1] agrees, by embarking capital in a utility, that its charges to the public shall be reasonable. His company is the substitute for the State in the performance of the public service; thus becoming a public servant. The compensation which the Constitution guarantees an opportunity to earn is the reasonable cost of conducting the business. Cost includes not only operating expenses, but also capital charges. Capital charges cover the allowance, by way of interest, for the use of the capital, whatever the nature of the security issued therefor; the allowance for risk incurred; and enough more to attract capital. The reasonable rate to be prescribed by a commission may allow an efficiently managed utility much more. But a rate is constitutionally compensatory, if it allows to the utility the opportunity to earn the cost of the service as thus defined.

[1] Italics inserted by author.

In this view what becomes of the concepts of private property and of its value for ordinary purposes? Justice Brandeis answers this question in a distinctly modern fashion. A public utility is no longer a medieval wagoner, or ferryman devoting his carriage or his ferry to a use in which the public has an interest but it becomes a corporation empowered to raise money to carry on a business in which the public has an interest. He says: "The thing devoted by the investor to the public use is not specific property, tangible and intangible, but capital embarked in the enterprise." Of course, this capital is protected against an unreasonable exercise of the police power of the State in the act of rate regulation by the operation of a rule such as that explained above. But he continues:

> The Constitution does not guarantee to the utility the opportunity to earn a return on the value of all items of property used by the utility, or of any of them. The several items of property constituting the utility, taken singly, and freed from the public use, may *conceivably* have an aggregate value greater than if the items are used in combination. The owner is at liberty, in the absence of controlling statutory provision, to withdraw his property from the public service; and, if he does so, may obtain for it exchange value. (Cases cited.) But so long as the specific items of property are employed by the utility, their exchange value is not of legal significance.

The divergence in the legal premises from which the argument of the majority, on the one hand, and that of the minority, on the other hand, proceed is too deep-seated to be explained by subjective differences. If the legal profession is to be helpful in the molding of our institutional developments in the regulation of utilities they must treat this controversy upon its merits and not

jump to the easy and self-evident conclusion that the law is as the majority states it. Granting that there are difficulties in the solution of this vexed problem if we proceed upon the authority of *Smyth* v. *Ames*, are the difficulties lessened if we adopt the "prudent investment rule" for which the minority contend? All who have studied valuation practices since the advent of administrative commissions must have been aware of the shortcomings which Justice Brandeis so well elucidates in the remainder of the opinion. He appears, however, to have been the first to raise the standard of revolt in a judicial opinion. What shall be done with his challenge and that of Justice Holmes?

A similar conflict arose in a recent case decided by the Supreme Court of Wisconsin. *Waukesha Gas and Electric Company* v. *Railroad Commission of Wisconsin*, 194 N. W. 846 (1923), involved the question whether a public utility should get the benefit of any increase in the market value of its property. The Commission had fixed the fair value of the property of the utility in 1913 at $156,800. In subsequent rate proceedings the Commission had adopted the procedure of bringing the 1913 valuation down to date by adding the cost of the additions made in the interim. This resulted in a finding of $424,868. Engineers for the utility made an appraisal upon the basis of the cost of reproduction new using five-year average prices. They contended that the value fixed ought to have been at least $594,904. The court stated the issue as follows: "It is contended that the present fair value of the property used or useful in affording the public service is the measure of the reward to which the owner of that property is entitled for the service rendered, such value to be established as of the time when the inquiry in regard to the reasonableness of the rates charged by the utility is under investigation."

Judicial determination of the present fair value is regarded by Justice Rosenberry, who wrote the opinion, as "the most complex and involved subject(s) with which courts are called upon to deal." Accordingly he enters "with hesitation upon a discussion of a subject which is so highly controversial. All agree that the rate base is the present fair value of the property used and useful for the convenience of the public in rendering the service which the utility undertakes to perform. The question is how shall the value be ascertained?"

The justice then proceeds to discuss the recent cases in which the Supreme Court of the United States has dealt with the valuation problem and finds that "these decisions have not entirely clarified the situation." In all of them he finds that while the court says that cost of reproduction less depreciation must be considered, "we look in vain for any statement as to what weight should be accorded to that factor." Consideration by a commission of all the factors enumerated in *Smyth* v. *Ames* evidently does not satisfy requirements in Justice Rosenberry's opinion, for "it cannot be that the repetition of a mere legalistic formula before the declaration of the trial court's final determination is sufficient to bless and sanctify the result, no matter what it may be."

So the court undertakes to determine the question for itself. As underlying and determining factors in this case the court sets forth the following: (1) that the property of the utility is held under an indeterminate permit; (2) that by its terms the municipality has a perpetual right to take the property of the utility upon making just compensation; (3) that under the public utility

law a company is required to furnish adequate service for a reasonable charge and that it may therefore be required to make additions to its property by public authority "without regard to past, present or future price levels"; (4) that the state guarantees a monopoly to the utility by prohibiting the competition of both municipalities and private corporations, except it be established upon a public hearing that public convenience and necessity require a second utility.

With this splendid start toward an independent analysis the court reverts to the language of the cases by accepting on authority the fundamental principle as stated in the *Minnesota Rate Cases* that it is property held in private ownership whose fair value is to be determined. To the writer there appears to be in what follows a curious mixture of true historical analysis and of merely formal legal statement. "It should be noted that it is the property which the constitutional guaranty protects and not a particular theory of valuation. Before the jurisdiction of the court can be successfully invoked it must appear that the property of the plaintiff is being taken, not that it is deprived of the benefit of market fluctuations in the value of materials and labor. With all due respect the proposition that the cost of reproduction new less depreciation, although it should no doubt be considered, is entitled to controlling or even considerable weight under present abnormal conditions, appears to us to be unsound."

It is apparent from the above statement that the court is constrained by the rule in *Smyth* v. *Ames,* and as later modified. Justice Rosenberry appreciates that there can be, under the fundamental conditions of public utility operation in Wisconsin, no organic relation between investment and cost of reproduction. Cost of reproduction is a competitive concept and fits with difficulty into a background where regulated monopoly dominates. However, instead of boldly attacking this theoretical inconsistency, the Justice reverts to the distinction between normal and abnormal conditions.[2]

The remainder of the court's analysis is superb. There are some minor points where one might feel disposed to pick flaws, but, on the whole, the court brings out the essentials. In giving his reasons why the cost of reproduction should not be given controlling weight the justice argues as follows: "In the first place, it ignores the fact that under *Munn* v. *Illinois,* 94 U. S. 113 (1876), when a person dedicates his property to a public use by investing it in a public utility, he divides with the people the right to control the use of the property so dedicated and thereafter the public has an interest in the use of the property which it may within constitutional limitations assert. That so investing his property the investor has given to it a status is now well established and recognized in the law. He withdraws it from the great mass of property not so situated and subjects it to a degree of public control from that time on.

"Second: Cost of reproduction new can be established only theoretically. Even in the case of a structure about to be erected, every-day experience fully confirms this. When applied to the property of a public utility, purchased under conditions which no longer exist and incorporated into the property of a public utility under circumstances that cannot be reproduced, it is not only theoretical but highly speculative.

"Third: The property of a public utility cannot be valued as is other prop-

[2] *Post,* p. 256.

erty, not devoted to the public use, which is subject to the laws of competition and therefore in an entirely different class. *In re Purchase Racine Water Plant,* 19 W. R. C. R. 83, at 143-145 for discussion.

"Fourth: In the competitive field the cost of reproduction new is given minor consideration in fixing the value of property because in that field the value is determined largely by its usability. For instance, would any one claim that the cost of reproduction new is even a guide to the present value of a defunct brewery plant? In the valuation of an office building the amount which it earns is a much larger factor in determining its value than cost of reproduction new. The usability or earning capacity being in a competitive field a dominant factor in the ascertainment of present fair value and the cost of reproduction new being at least a minor factor, how can it be said that it is entitled to great weight in valuing the property of a public utility when the earning power is limited by law. *In re Laporte Gas and Electric Company,* 1921 A, Pub. Util. Rep. 824, at 844 *et seq.*

"Fifth: If the cost of reproduction new is to be accorded any considerable weight when the price level rises, it must be accorded the same weight when the price level falls. Utilities in Wisconsin, however, are not permitted, except within very narrow limits, to consider price levels but are required to furnish an adequate service when and as needed irrespective of price levels. It would seem to be a rank injustice to compel a public utility to make an investment and then after the investment is made hold that although the public compelled the utility to make the investment when prices were high, prices having fallen, the utility is entitled to earn a return only upon the present cost of labor and material. Utilities must grow and expand with the needs of the public. They have very little if any option in regard to the matter.

"Sixth: If a public utility which has during a 20-year period earned and distributed a reasonable return upon the investment value of its property is permitted to increase its rates by reason of the fact that labor and materials have advanced in price in the open market, the earnings derived from such increase in rates will constitute an addition to its prior earnings and the utility will thus be permitted to earn more than a reasonable rate upon its investment. The increased earnings may be capitalized in one form or another and investments in public utilities will then have a speculative element and be deprived of the stability which they have hitherto enjoyed. If the increased earning power is capitalized, the increased capitalization will constitute a perpetual fixed charge as against the public.

"Seventh: The materials—brick, stone, copper, and so forth—which enter into the construction of the plant of a public utility lose their identity as such and become a part of a new whole and must be valued as such. It does not seem reasonable to say that the value of a cast-iron pipe in a water main rises and falls in value with market fluctuations of pipe which is offered for sale in the open market. After material is incorporated into a public utility plant, its value must be determined as a plant, not as material not so incorporated.

"For these reasons we consider that no great weight is to be attached to cost of reproduction new less depreciation under present conditions and particularly so under the conditions that prevailed in 1921."

Then follows a discussion of the

"prudent investment" theory from the point of view that it is administratively best calculated to afford owners a reasonable return, that it will best enable the Commission to perform some of its other functions such as the control of security issues, that it will tend to stabilize investments, reducing risks and lowering capital costs to consumers. The court finally concludes: "In determining the present fair value of a public utility operating under our public utility law, it is our view that justice as well as sound economic practice requires that controlling weight should be given in the valuation of the plant of a public utility to the investment cost where the investment has been prudently made. In determining the present fair value of the property of a public utility for rate-making purposes, but little if any weight can be given to capitalization of earnings or to stock and bond values for the reason that these are dependent almost entirely upon the rates charged, the reasonableness of which is the very subject under investigation. If the rates charged be unreasonably low, the value of the property upon that basis would be depressed. If they be unreasonably high, it would be inflated."

What we desire most of all to point out is that Justice Rosenberry is in substantial agreement with Justice Brandeis in that he feels that regulation must proceed upon the theory (1) that public utility property is not like other private property, (2) that the property which the owner devotes to the public service is not the physical thing but the beneficial relations growing out of the supply of free capital and the assumption of risks. He warns, for instance: "We should scrutinize with great care a determination which found the present fair value of the physical property of a utility plant in this state to be less than its actual cost, providing the investment had been prudently made, and we should scrutinize with even greater care a finding which would impose upon the public a schedule of rates which would earn a reasonable return upon $170,000, which the utility never invested." The balance of the discussion upon this point apparently represents a relapse from the clear position taken earlier. In the following, for instance, the court is clearly attempting again to reconcile the irreconcilable. "Nor do we wish to be understood as saying that the actual cost of the physical plant of a public utility, even when the investment is prudently made, should be absolutely controlling.

"We should not attempt to deduce a formula. If, however, we were to accord rank to the various factors in accordance with the weight which is to be given to each in determining present fair value for the purpose of establishing a rate base, it would be as follows:

"1. Actual cost of the plant when the investment has been prudently made.

"2. Under normal conditions, cost of reproduction new less depreciation. (When conditions are abnormal, cost of reproduction new less depreciation should be fourth.)

"3. Going concern value.

"4. Working capital.

"5. Other elements of value which may be presented in a particular case."

We have purposely refrained from bringing out in greater detail the arguments that have been advanced on behalf of the continued use of the old rule. It will suffice to state the issue raised by these decisions. Whatever may be the final answer in the pending valuation controversy, it is certain that the point touched upon in these decisions will have a determining influence.

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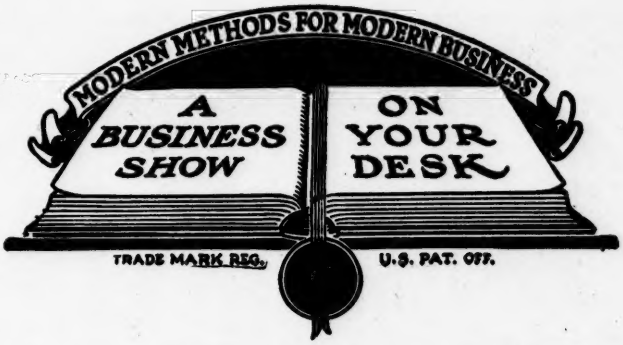

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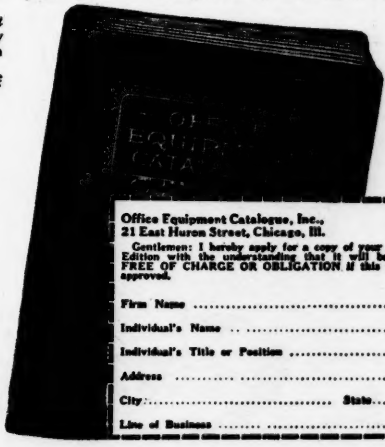

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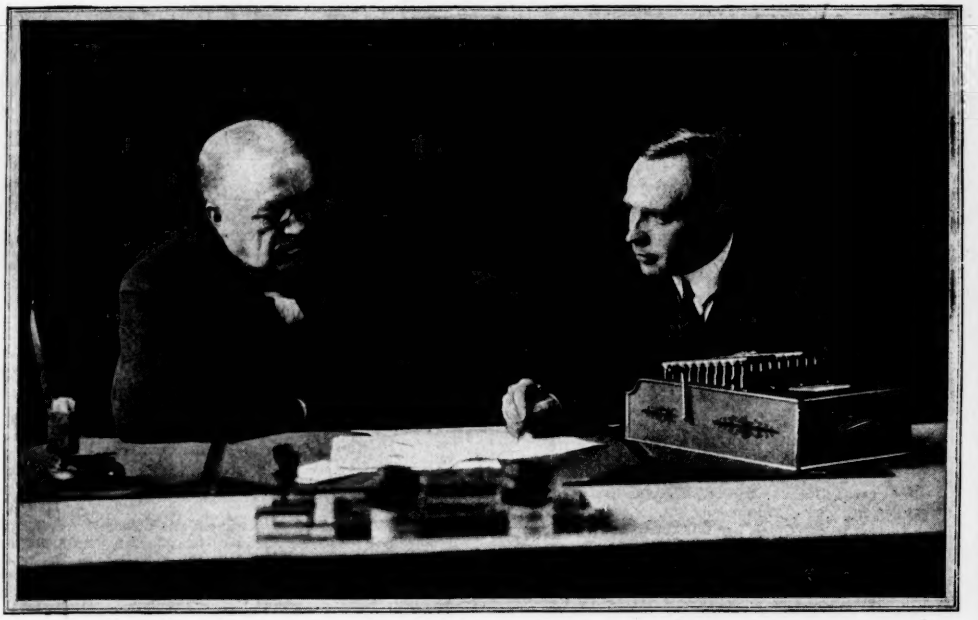

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